SUPPLEMENT.

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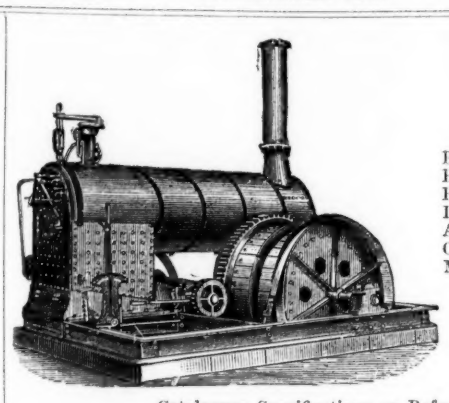

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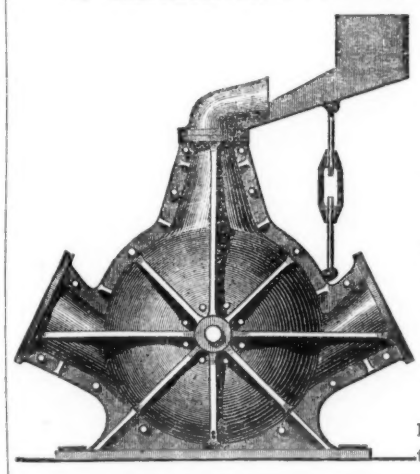

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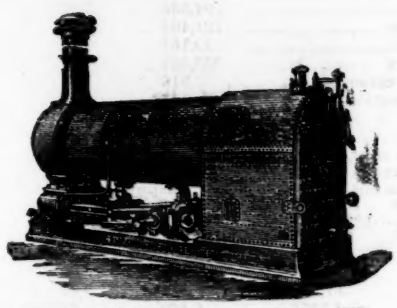

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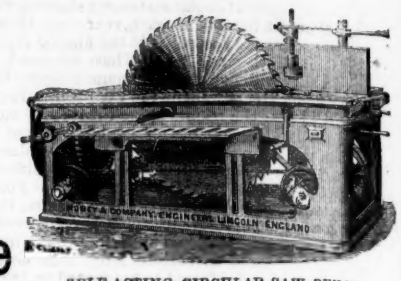

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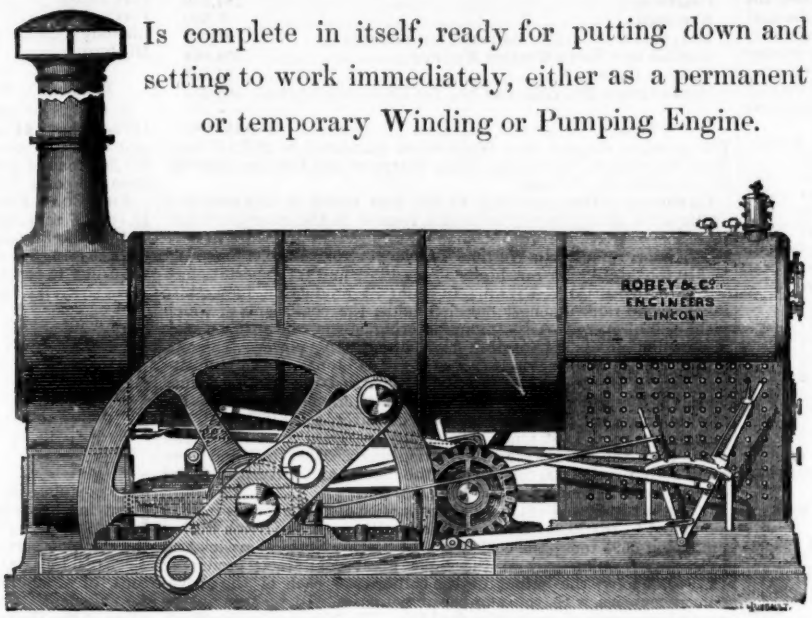

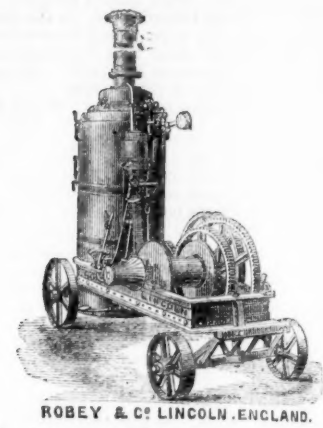

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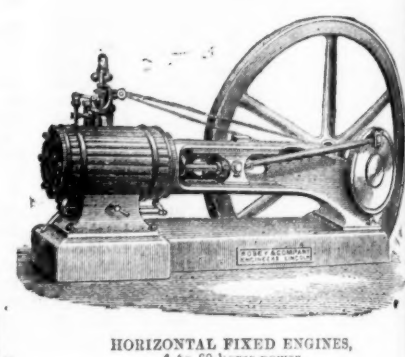

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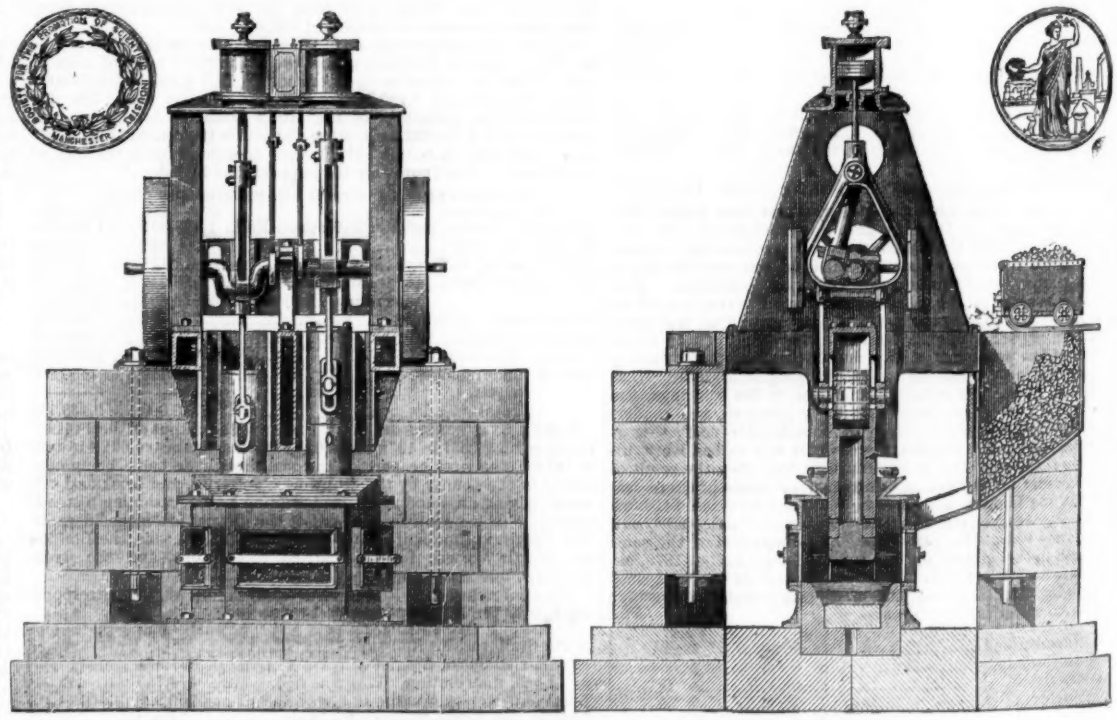

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NEW AND SECOND-HAND.

MINERAL STATISTICS OF THE UNITED KINGDOM FOR THE YEAR 1879.—No. IV.

PRODUCTION AND DISTRIBUTION OF COAL.

The total number of collieries producing coal in the year 1879 numbered 3877, compared with 3768 in the previous year, the production of 1879 amounting to 134,008,228 tons, against 132,607,866 tons in 1878. In the introduction to the volume of Mineral Statistics for 1878, as in 1879, appears a tubular statement showing the production of coal in the United Kingdom in each year since 1854, as given by the Mineral Statistics, and according to the annual reports of H.M.'s Inspectors of Coal Mines since 1864. These returns it appears have been obtained under widely different circumstances—the one voluntary, the other under the powers of the Coal Mines Regulation Acts, and it is remarked that the results approximate very closely, the differences upon the large quantities of coal raised not being in any case larger than might be expected from the irregularities existing in the weights used in separate districts, and the differences in the dates to which the returns have been made up. For example, in some districts, as in South Wales, in Glamorganshire, the returns are given in long tons of 2520 lbs. (subsequently converted into statute tons), while in the returns rendered under the Coal Mines Regulation Acts all returns are made in statute tons. The actual difference between the returns above referred to amounted in 1878 to but 4197 tons, and in 1879 to 287,835 tons, figures unimportant when the aggregate totals are reviewed. In the year 1854 and since the coal raised from the collieries of the United Kingdom has been regularly published by the Mining Record Office; in the year 1864 the returns of H.M.'s Inspectors first appear, and these returns until the year 1873 were computations; from that date the returns are the result of the "Coal Mines Regulation Act, 1872." To make this quite clear the respective returns appear side by side:—

Year.	H.M's Inspectors Returns.	Mining Record Office Returns.
1864	Tons 95,122,919	Tons 92,787,873
1865	98,911,169	98,150,587
1866	100,728,881	101,630,544
1867	105,077,748	104,500,480
1868	104,566,959	103,141,157
1869	108,003,485	107,427,557
1870	112,875,725	110,431,192
1871	117,439,251	117,352,028
1872	123,393,853	123,497,316
1873	128,680,131	127,016,747
1874	126,590,018	125,043,257
1875	133,306,485	131,867,105
1876	134,125,166	133,344,766
1877	132,179,968	134,610,763
1878	132,612,063	132,607,866
1879	133,720,393	134,008,228

In the annexed summary we give the detailed production of each coal field, with the number of collieries in 1879 and the previous year:

Coal fields.	1879. No. of collieries.	1879. Tons.	1878. No. of collieries.	1878. Tons.
England—				
Northumberland and North Durham	183...	12,245,597...	186...	11,423,334
South Durham	180...	17,306,482...	184...	18,710,550
Cumberland	33...	1,459,170...	31...	1,388,233
Westmoreland	3...	4,697...	3...	4,540
Cheshire	26...	720,350...	33...	616,575
Lancashire, North and East	362...	9,020,645...	344...	8,634,500
Lancashire, West	179...	9,591,700...	178...	9,425,525
Yorkshire, North Riding	3...	6,695...	4...	6,840
Yorkshire, West Riding	525...	16,024,249...	526...	15,581,970
Derbyshire	234...	7,450,370...	237...	7,190,000
Nottinghamshire	41...	4,249,242...	41...	4,107,350
Warwickshire	31...	1,060,016...	34...	1,025,450
Leicestershire	27...	1,035,016...	28...	1,020,500
Staffordshire, North	144...	4,025,535...	145...	4,072,416
Staffordshire, South	425...	9,350,000...	437...	9,130,774
Shropshire	62...	854,380...	63...	830,075
Gloucestershire	101...	1,250,718...	103...	1,147,605
Somersetshire	39...	767,930...	39...	693,000
Monmouthshire	129...	4,640,430...	131...	4,490,290
North Wales—				
Flintshire	52...	720,697...	51...	707,785
Denbighshire	53...	1,498,985...	54...	1,513,500
Anglesea	— ...	— ...	2...	672
South Wales—				
Glamorganshire	273...	12,359,180...	277...	12,144,250
Brecknockshire	5...	51,250...	3...	119,975
Pembrokeshire	8...	85,300...	8...	37,000
Carmarthenshire	39...	630,967...	41...	625,000
Scotland—				
Eastern District	312...	11,300,567...	304...	11,667,559
Western District	361...	6,169,360...	230...	6,169,723
Ireland	47...	129,000...	50...	721,975
Total of the United Kingdom	3877...	134,008,228...	3768...	132,607,866

PRICE OF COAL.—Compared with the previous year prices have been fairly maintained in Durham and Northumberland; the seaborne coal in the London Coal Market always commanding a good price shows but little variation, although it is well known that prices have been comparatively unremunerative to the conlowner. This scarcely appears plain to the general observer; however it must be borne in mind that many of our coal mines, extending over large areas with workings that might be measured by hundreds of miles, are in times of low prices matters for serious consideration. Closing a colliery is invariably a serious loss to its proprietor, inasmuch as the ventilation ceases the water accumulates in the workings, the general condition of which becomes greatly impaired, and renders the reopening of workings a question of considerable cost; thus it frequently happens that a colliery proprietor will rather work his coal at a loss than incur the heavy expenses too often the result of putting it in order for re-working. In 1879 the average prices of seaborne coal in the London market was, Wallsend Newcastle 15s. 9d. per ton, Hartley 14s. per ton, the Sunderland and Hartlepool Wallsend respectively being 17s. per ton. The average cost of the same coal delivered in the cellars of the consumers did not, in 1879, exceed from 22s. to 25s. per ton. The average price of coal and slack in the following districts at the pits' mouth was (omitting a few high and low priced varieties) as follows:—

Coal field.	Coal.	Slack.
Northumberland	7s. 8d.	4s. 4d.
South Durham	8 0	4 8
Cumberland	8 0	4 0
Derbyshire	7 3	4 3
Lancashire	8 6	4 4
Cheshire	11 3	4 8
North Staffordshire	7 8	3 6
South Staffordshire	8 2	3 6
Nottinghamshire	6 4	4 8
Warwickshire	7 2	4 0
Shropshire	8 9	3 10
Somersetshire	10 0	4 0
Gloucestershire	9 9	4 9
Yorkshire	7 9	4 4
Monmouthshire	6 2	5 0
North Wales	10 0	4 0
South Wales	7 3	4 4
Ireland	11 10	8 10

In those districts producing cannel coal the highest quotations per ton were respectively—Lancashire 20s., North Wales 37s., Ireland 23s. 4d.

DISTRIBUTION OF COAL.—The North Eastern Railway, traversing in all directions the Great Northern coal field, carried of coal and coke for general distribution 9,320,511 tons, compared with 9,907,829 tons in the previous year, including those quantities conveyed to shipping ports to be sent coastwise and exported. Other lines carried coal in lesser quantities: thus the Great Northern is credited with carrying 275,714 tons from Durham; the Midland Railway with 189,255 tons of coal and coke; the Furness Railways 555,180 tons and the Manchester, Sheffield, and Lincolnshire 135,112 tons. Of the coal of the district 4,847,681 tons were distributed locally for land sale, and a further quantity of 552,254 tons for railway use. The coal used in pig-iron manufacture amounted to 1,161,587 tons, and a further quantity of 2,250,000 tons appears to have been consumed in the numerous ironworks, mills and forges, foundries, &c., abounding in the two counties. The coal sent to foreign countries was 6,702,785 tons, and coastwise 6,266,739 tons—colliery consumption absorbing 1,215,000 tons, and local manufactures 1,500,000 tons. The total output of the 366 collieries of Durham and Northumberland being in 1879 29,552,079 tons. Considerable quantities of small coal are exported to France from the Great Northern coal field, where it is coked and used in the blast furnace. The writer recently at Outreau, near Boulogne, in the Pas de Calais, saw 80 ovens (40 back to back) producing coke of excellent quality from this small coal, the ovens being drawn and recharged at intervals of 24 hours, the ironmaster finding it more economical to make the coke rather than import it from England, inasmuch as the cost of carriage of 11 tons of coke fom Newcastle to the port of Boulogne would, bulk for bulk, be equivalent to 21 tons of coal, and cost the same amount for freight.

CUMBERLAND AND WESTMORELAND.—The coal of these coal fields, especially the first named, are largely exported to Ireland, the principal shipping ports being, Whitehaven, Workington, and Maryport. The production of 1879 is thus accounted for:—

Distribution.	Tons.
Coastwise	584,559
Exported	3,500
Maryport and Carlisle Railway, for land sale	101,061
London and North-Western Railway	354,664
Furness Railway	54,808
Used at ironworks, collieries, and for local consumption	365,275
Total	1,463,867

The quantity shipped from Whitehaven amounted to 217,245 tons, from Workington 53,718 tons, from Maryport 292,426 tons, and Silloth, Carlisle, 21,170 tons.

CHESHIRE.—The great bulk of the coal raised in this county is employed in the numerous industries located in the county and surrounding districts. Of the 720,350 tons raised in Cheshire in 1879 the London and North-Western Railway carried 169,099 tons, and 59,310 tons to Chester for shipment coastwise and for exportation.

LANCASHIRE COAL FIELD.—In point of production Lancashire takes second rank amongst our coal fields, the coal seams of which yield coal of every variety—manufacturing, steam and furnace coal, also cannel, producing gas of a high illuminating power. The output of the 541 collieries in 1879 was 18,612,345 tons; of this quantity the Lancashire and Yorkshire Railway carried out of the county 3,915,411 tons, the London and North-Western 6,885,953 tons, the total quantity shipped from the ports of Liverpool, Fleetwood, &c., amounting to 644,132 tons. The quantity carried from the Wigan district by the Bridgwater Navigation was 260,000 tons, and from other collieries 498,000 tons, while the Leeds and Liverpool Canal carried for shipment a total of 1,186,000 tons.

YORKSHIRE COAL FIELD.—The production of the collieries in 1879 amounted to 16,030,944 tons—the three collieries in the North Riding producing 6695 tons; the coal areas of Derby, Notts, Warwick and Leicester, forming part of the same great coal tract, producing 13,794,644 tons; the output of the collieries of each of the above-named counties, with the number of collieries, will be seen in the general summary of production for 1879. The Manchester, Sheffield, and Lincolnshire Railway carried from the West Riding in 1879 1,059,589 tons, and from South Yorkshire 3,494,690 tons. The total weight of coal carried by the same railway in 1879 amounting to 5,152,269 tons. The Midland Railway conveyed a total weight of 10,864,996 tons from the following counties:—

Coal fields.	Tons.
Yorkshire	2,199,892
Derbyshire	5,689,527
Leicestershire	1,054,433
Nottinghamshire	1,625,471
Warwickshire	295,673
Total	10,864,996

The London and North-Western Railway contributed in a lesser degree to the distribution of coal from the above-named coal field, carrying 632,592 tons, of which 251,455 tons were from Yorkshire, 296,485 tons from Warwickshire, and the remainder in nearly equal quantities from Derbyshire and Leicestershire. The Great Northern Railway in like manner carried out of the South Yorkshire district 989,554 tons, and 971,235 tons from the West Riding, while from Derbyshire the same system carried 955,468 tons.

SOUTH STAFFORDSHIRE AND WORCESTERSHIRE (also known as the Black Country, in which occurs the celebrated Ten-yard seam of coal).—The 425 collieries in operation in 1879 produced 9,350,000 tons, compared with 9,130,744 tons in the previous year. The district within the operations of the Mines Drainage Association produced in 1879 2,951,021 tons, other districts in the coal field 6,398,979 tons. The coal raised in 1879 is thus accounted for in the way of distribution. The figures for 1878 appear side by side:—

DISTRIBUTION OF SOUTH STAFFORDSHIRE COAL.

How distributed.	1879—tons.	1878—tons.
Carried by London and North-Western Rail..	1,499,337 ...	1,086,370
Midland Railway	209,561 ...	169,392
Great Western Railway	311,178 ...	325,364
Birmingham Canal—for Birmingham	828,942 ...	859,122
for mining districts	2,968,800 ...	3,030,570
Out of county by canal	227,782 ...	208,828
Domestic consumption	1,500,180 ...	1,801,128
Colliery consumption	950,110 ...	1,000,000
Used in manufactures, &c.	854,110 ...	650,000
Total	9,350,000 ...	9,130,774

NORTH STAFFORDSHIRE COAL FIELD.—The output of the 144 collieries raising coal in 1879 was 4,025,535 tons, against 4,072,416 tons in 1878. The greater part of the coal brought to bank being consumed in the county by the ironworks, potteries, and brick and tile works, giving an impetus to coal mining and occasioning a steady demand. The quantities sent out of the district are inconsiderable. The North Staffordshire Railway carried 891,974 tons, the London and North-Western Railway carried 73,602 tons, and the Great Northern but 21,168 tons.

The coal raised in 1879 was distributed as follows, the corresponding figures for 1878 appears side by side:—

How distributed.	1879—tons.	1878—tons.
North Staffordshire Railway—		
Carried out of district	891,974 ...	727,304
Local distribution	473,765 ...	472,940
Trent and Mersey Canal	250,920 ...	244,157
London and North-Western Railway	73,602 ...	62,129
Great Northern Railway	21,168 ...	14,886
Coal used at ironworks	700,000 ...	750,000
Colliery consumption	125,596 ...	150,000
Potteries and brickworks	1,488,510 ...	750,000
Domestic and local consumption		900,000
Total	4,025,535 ...	4,072,416

Passing on to the coal fields of Shropshire, Gloucestershire, Somersetshire, and North Wales, but little variation appears in the production of 1879 compared with 1878. The Shropshire coal distributed by the London and North-Western Railway did not exceed 69,115 tons, 785,165 tons being used at the ironworks in manufactures and in domestic consumption. The Midland Railway carried from Gloucestershire and Somersetshire 209,924 tons; while of the North Wales coal the London and North-Western Railway carried 316,200 tons, and the Great Western Railway 952,154 tons.

SOUTH WALES COAL FIELD.—In following the production of this great coal tract the output of the 325 collieries in 1879 amounted to 13,126,397 tons, compared with 12,926,225 tons; this is exclusive of the Monmouthshire collieries in the eastern area of the coal field, which in 1879 produced 4,640,340 tons, compared with 4,490,290 tons. During 1879 a considerable increase appears in the quantities of coal distributed by railway from South Wales compared with the returns for 1878; thus the Great Western carried 4,763,429 tons against 4,422,464 tons, the London and North-Western 827,831 tons against 758,790 tons, and the Midland Railway 598,619 tons against 552,392 tons in the previous year. The Taff Vale Railway, in like manner, carried 5,849,184 tons, the great bulk of which was conveyed to Cardiff and Penarth Junction, compared with 5,613,639 tons in 1878 and 5,170,953 tons in 1877. The details of 1879 and 1878 were as follows:—

Railway distribution.	1879—tons.	1878—tons.
To Cardiff and Penarth Junction	5,064,111 ...	4,761,254
Sold retail	294,556 ...	327,506
To Quaker's Yard Junction	121,405 ...	90,664
To Mountain Ash Junction	10,160 ...	17,903
Conveyed by other railways	352,329 ...	413,781
To Brecon and Merthyr Junction	5,916 ...	254
To Walnut Tree Bridge Junction	707 ...	2,277
Total	5,849,184 ...	5,613,639

The shipments of coal, coke, and patent fuel coastwise and to foreign countries in 1879 was as follows:—

Ports.	Coastwise. 1879—tons.	Coastwise. 1878—tons.	Exported. 1879—tons.	Exported. 1878—tons.
Newport	983,725 ...	876,624 ...	935,556 ...	760,061
Cardiff	827,458 ...	815,877 ...	4,427,602 ...	4,193,760
Swansea	251,992 ...	238,809 ...	775,301 ...	745,435
Briton Ferry	185,287 ...	192,713 ...	53,405 ...	20,282
Port Talbot	79,434 ...	67,940 ...	21,272 ...	8,032
Porth Cawl	66,741 ...	67,476 ...	8,460 ...	730
Llanelly	116,389 ...	123,415 ...	— ...	70,265
Millford	27,153 ...	32,813 ...	— ...	—
Total	2,538,179 ...	2,415,667 ...	6,221,597 ...	5,798,565

In the ab are included the quantities of fuel sent coastwise in 1879—coke 44 tons and patent fuel 1045 tons; while of the coke sent to fore countries there appears to have been 40,330 tons and 317,564 tons of patent fuel. The total value of the fuel exported from the ports of South Wales in 1879 amounted to 2,884,164*l*.

THE COAL FIELDS OF SCOTLAND.—The production in 1879 was 17,469,927 tons, against 17,837,282 tons in 1878. Of the production in 1879 the Eastern district raised 11,300,567 tons, and the Western district 6,169,360 tons, apportioned to the several counties as follows, according to returns of H.M.'s Inspectors—

Eastern Division. Counties.	Quantities—tons.	Western Division. Counties.	Quantities—tons.
Clackmannan, &c.	271,664	Renfrew	134,872
Edinburgh	758,371	Argyle	107,111
Fife	1,726,701	Ayr	3,203,052
Haddington	233,276	Dumbarton	216,282
East Lanark	7,135,416	West Lanark	2,250,504
Linlithgow	464,823	West Stirling	257,539
East Stirling	710,316		
Total	11,300,567	Total	6,169,360

Very complete details of the movement of the above quantities are given in the railway returns. The North British Railway carried 5,375,494 tons, in which is included some 469,738 tons conveyed to the shipping port of Burntisland. The Caledonian Railway conveyed 5,983,056 tons; the Glasgow and South-Western Railway 2,537,576 tons, of which 892,300 tons were for home use, and 1,645,276 tons for shipment. Coal sent coastwise from Scotland in 1879 to other parts of the United Kingdom amounted to 1,421,667 tons; that exported to foreign countries 2,012,785 tons, of the declared value of 812,798*l*.

The consumption of coal in the Metropolis exhibits a considerable increase in 1879, compared with 1878, doubtless occasioned by the low prices prevailing during the past year. London, it may be observed, is supplied by the two great highways—the sea and railway; formerly the chief source of supply was by sea, in recent years our railways have greatly contributed not only to the more abundant supply of coal to the Metropolis but also to the development of our coal fields. And in glancing at the returns of the past two years the fact appears that while the seaborne trade in coal fairly maintains its own, yet the introduction of increased quantities of coal, the produce of the Midland and other coal fields, is being gradually extracted. Taking the past two years the following figures of coals (seaborne) sent to London, as distinguished from those quantities sent by railway and canal, will clearly indicate the point referred to—

	1879—tons.	1878—tons.
By sea	3,508,526	3,198,309
By railway and canal	6,550,285	5,596,267
Total brought into London	10,058,811	8,794,576

Showing an increase in the consumption of coal in the Metropolis of 1,264,235 tons in 1879, compared with 1878.

The total quantities of coal exported during the past year shows a great increase compared with the returns for 1878; on the other hand, a glance at the declared value at the port of shipment shows a decrease in value from 9s. 6d. per ton in 1878 to 8s. 8d. per ton in 1879. The total export of coal, coke, and patent fuel in 1879 and previous year is as follows, with the declared value:—

	1878. Quantities exported. Tons.	1878. Declared value. £	1879. Quantities exported. Tons.	1879. Declared value. £
Coals	14,998,527 ...	7,010,036	15,740,082 ...	6,793,932
Coke	274,239 ...	201,708	345,457 ...	231,671
Patent fuel	221,867 ...	118,730	356,776 ...	181,196
Total	15,494,633 ...	7,330,474	16,442,295 ...	7,206,799

Comparing the totals of coal carried by railway, canal, and sea, including the exported quantities, in 1879 with 1878 an increase appears of 6,344,049 tons—indeed, in every railway return, with one or two exceptions, there has been an increase in the total of coal carried from the place of production to other places in the kingdom.

In concluding our notice of the "Mineral Statistics, 1879," issued from the Mining Record Office, it will be a fitting place to note that this volume has regularly appeared since 1848, recording the production of the mines of the United Kingdom.

ARTIFICIAL STONE.—The large quantity of refuse or unmarketable stone produced even with the most careful quarrying has led to many inventions for the agglomerating of these fragments, and amongst the most recent is that of Messrs. BRAULT, WATKINS, and SMITH, of Laprairie, Montreal, which has reference to a composition to be applied to any of the purposes, specially decorative, for which stone or marble are now used, and which can be easily moulded into any shape desired, and made to imitate closely any variety of the above materials. This compound may be described as having as a base sulphur, to which is added, in about the proportion of two to one, any kind of stone, or marble, or ivory, bone-dust, ground into granules of any degree of fineness. In the process of manufacture the sulphur is brought to and kept at about the melting point, the quantity (double the amount of the sulphur) of stone or marble dust used (heated or not, as desired) being gradually incorporated therewith, the time taken up in the operation, and the amount of heat to which the sulphur is subjected, varying according to the quality of the substance mixed therewith and that of the material which it is intended to imitate. Any colouring matter may be mixed with the compound to give the tint required. The compound thus made may be run directly from the crucible into the moulds, or cast into ingots to be melted down as desired. There can be no doubt that for many purposes such a material would be both cheap and desirable.

HOLLOWAY'S PILLS—WEAKNESS AND DEBILITY.—Unless the blood be kept in a pure state the constitution must be weakened and disease supervene. These wonderful pills possess the power of neutralising and removing all contaminations of the blood and system generally. They quietly but certainly overcome all obstructions tending to produce ill health, and institute regular actions in organs that are faulty from derangement or debility. The dyspeptic, weak, and nervous may rely on these pills as their best friends and comfortors. They improve the appetite and thoroughly invigorate the digestive apparatus. Holloway's pills have long been known to be the surest preventives of liver complaints, dreadful dropsies, spasms, colic, constipation, and many other diseases always hovering round the feeble and infirm.

Original Correspondence.

GOLD QUARTZ AND ITS TREATMENT.—No. I.

[In the appendix to the prospectus of the Republican Mountain Silver Mines there is an important statement, with which Mr. Stech's name is connected, as to the prospects and capabilities of the property. The subjoined letter addressed to the Chairman of the company—Mr. T. E. Foakes—will afford ample evidence of the practical knowledge of the writer.]

Sir,—With the greatest pleasure I follow your request to give you in the following communication my views in regard to gold mining, based upon the experience of a great many years of actual work in superintending gold mines, and mills in California particularly, and I hope that all the items of information I permit myself to give you in regard to the working of gold quartz, by milling and other processes, will be of advantage to you; and I herewith assure you that I only speak from actual experience, having used the same processes of which I shall speak further on. At the same time permit me to say that I never have anywhere published my processes, and consequently you will do me the favour only to make use of the same at any mine and mill which you are interested in. The working of a mine is very simple, I mean of course the extraction of the ore from the ground, so that only the principle has to be followed to do the actual work on and with the metal bearing lode or vein, and this in the most economical manner and by thoroughly underbuilding the parts of the mine from which it is extracted, as well as again to thoroughly underbuild all the rock through which shafts, tunnels, drifts, &c., have to be built, so as to arrive with the greatest safety at the parts of the metal bearing lode or vein from whence the ore is to be extracted, and to keep all such works well timbered where necessary, and always in the best repair, so as to avoid any breaking down of ground. It is understood that drainage has to be arranged where water is troublesome in any mines, and this either by tunnels or by pumping works, motive power either steam or water power. The Knowles direct acting steam-pumps I recommend the highest, and I have introduced the same in California and have used them at the Browne's Valley gold mines, the Pennsylvania and the Jefferson mines, at Brown's Valley, near Marysville, California, where a large Cornish pump, with 18 in. diameter pipes and a 120 horse-power steam-engine could not overwhelm the water at the mines. The mines were then 750 feet deep and all the works underground completely filled with water up to the top of the ground, and could not be pumped empty by the use of the above-mentioned Cornish pump; but this was done by the Knowles direct acting steam-pumps, of which I only used two, one at the top of the ground and the other at the depth of 350 feet down in the inclined shaft, the lower one pumping into a reservoir placed at this depth, and the upper one pumping from this reservoir to the top of the ground, the steam taken directly from the boilers to the pumps without the use of any machinery or engine on the surface of the ground. I afterwards used the standing engine of 120 horse-power only for the working of the quartz mills. I will not say any more about the working of a mine, I mean the extraction of the ore from the ground, as any partially experienced miner can do this. But the extraction of the metal from the ore, and particularly the more or less complete extraction of the gold from the gold-bearing quartz, is until now so very incomplete that nearly all failures in working gold mines are hereby caused. The common way of milling the ore gives in the most cases under 50 per cent. of the gold contained in the quartz, and in a great many cases not even enough pay to cover the expenses of mining and milling and, consequently, it is bound to become a failure. In all these cases you will find that the assays and an analysis of the ore will entitle the large returns, but the working process generally in use will not justify the expectations. The milling process is consequently too incomplete, and old mistakes are generally followed up, and unless the ore becomes richer in different parts of the mines or by coming to greater depth on the lode, where experience proves that always the richer class of ore is found, the consequences are bound to become disastrous and ruinous.

The most complete working of gold ore is "the chlorination process" as used at Freiberg, in Germany, and also at Grass Valley, in California; but only certain classes of gold ore can be so treated successfully by this process, which gives up to 95 per cent. of the assay value of the ore at a cost of 4*l*. to 5*l* per ton of 2000 lb. weight. The use of this process requires a thoroughly learned and experienced man. The next good process of working gold ore is "the Stedtefeld process" of roasting and smelting the ore. This also requires an experienced man and an expenditure of about 8000*l*. to erect the smelting furnaces and works. Then comes the milling process, by pounding or crushing the ore under stamps and amalgamating the gold by the use of quicksilver, and generally in connection with the milling process, the use of pans, arastres, buddles, and other kind of help, so as to save as much of the gold afterwards which is at first lost by the process of crushing under stamps and amalgamating with quicksilver.

As you have in your mines, in which you are interested, this process of milling, as I would call it, I will permit myself to speak now thoroughly about this process; and I beg of you to excuse me if I speak in such a way as if the party who might be benefited by my communications would understand little or nothing of such milling process, or of the working of gold-bearing ore, and the saving of the gold contained in such ore. A quartz stamp mill consist of iron stamps contained and working in iron mortars. These iron mortars should always be cast in one piece, so as not to allow any leakage of quicksilver. Inside and at the bottom of these mortars is room for four or five dies. On these dies drop, according to the size (arrangements of these mortars) either four or five stamps. These stamps should always have a weight of 700 to 800 lbs. apiece; a greater weight has proved impracticable, using up too much iron; less weight, like 500 lbs. for instance, is not sufficient to pound up the quartz finely enough and fast enough. These stamps should drop each minute 75 to 80 times, they will then work 1½ to 2 tons of ore per day, according to the hardness of the quartz. It is very important that these stamps should drop on the dies in the most practical order, so as to produce inside of the mortars, where the quartz is crushed, and into which mortars flows all the time a regulated quantity of water at each drop of the stamp, the action of a wave, of the quartz pulp and the water. In this way the pulp is in a most regular way thrown against the screens there fastened to the front part of the mortar, so that the quickest and most regular discharge of the pulp from the mortar on the plates in front, and there fastend on, an incline is obtained. If I have a mortar with five stamps, numbers 1, 2, 3, 4 and 5, they should drop in the following order, and will then produce in the most perfect manner the true action of a wave. At first drops No. 3, then drops No. 1, then drops No. 5, then No. 2, then No. 4. If I have a mortar containing only four stamps Nos. 1, 2, 3, 4, I drop them first No. 2, then No. 4, then No. 1, and then No. 3. This will again give the action of a wave, and in both cases no splashing of the pulp. Very few millmen know this advantage, and millwrights and mechanics building the mills have no idea of such advantages as I frequently have found. The cams above can very easily be set in such a way so as to produce the drop of the stamps now described. All grease or oil to be used around the stamps and the mortars should be most carefully handled, and in all parts where the friction of iron outside of the mortars require its use the grease should be so protected that no droppings can fall into the mortars, otherwise this grease will immediately foul the quicksilver to be used inside of the mortars, and will prevent the amalgamation of the gold and the quicksilver. Inside of the mortars should always be copper plates on all four sides of the mortar; this copper amalgamated with quicksilver.

I will speak particularly about the amalgamation of all copper plates in quartz mills. The screens in front of the mortar, and fastened to the same, on a sliding frame made of wood and lined with straps of blankets, should be fine enough so as to show a very fine nearly pulverised quartz pulp coming out of the mortars. In this way the coarser gold has to remain inside of the mortar, and the amalgamated gold inside of the mortar will also stay there. Let me make a general remark about the amalgamation of the gold with quicksilver processes. Where I have the sole command in regard to working a gold mine and mill, I never would have any milling of ore, which I, in most cases, always call "butchering the gold ore." The ore should be roasted and smelted, or should be broken in Blake's rock-breaker, the ore falling from one rock-breaker into another, and in this way passing through three rock breakers, would be fine enough for panwork; then (in the pans of course) worked wet and amalgamated with quicksilver. The tailings from the pan processes should be concentrated on various buddles. I feel sure this would give the largest result, with the exception of the chlorinisation process or the Stetefeld process, or roasting and smelting. I would always be in favour of doing away with stampmills, which are most expensive to be erected, to be kept in order, and to be attended to by engineers, &c., and in most cases are nothing more than old sett traps, and the ruin of many hundreds of good mines and thousands of mine-owners and miners. As I mentioned at the commencement, the following up of mistakes kills many a mine. To illustrate this, I will say one party has a mine, the ore assays are rich, this party builds a mill—say 20 stamps—and thinks he is now a rich man. To buy the mine and to build the mill (such mill costing on an average 150*l*. to 200*l*. each stamp, according to freights to be paid for transportation of building material and machinery) this party had perhaps already to get into debt to enable himself to accomplish this work, but he does not mind this for a moment, because the ore assays rich, and there is plenty of such ore. The mill work is then started, the mill result does not cover the expenses, all kinds of trials are made, but with no better result than perhaps once in a while that one month gives a little profit, for which one or the other of the millmen get the credit, but quite undeservedly, as such men are very apt to take advantage of duping the owner, who knows nothing himself about the work. The secret is that this part of the gold mine has ore at this time where the gold contained in quartz is a little coarser, and this gold cannot be lost because it is too coarse for the meshes of the screens in front of the mortars, The final result of the work at this mine is either a failure, or before the owner makes his failure he sells out on the strength of his rich assays of the ore and of the value of the plant, the mine, the mill, the outhouses, and so on. The other party buying follows up the same mistakes, because the ore assays are so rich, and he has no courage to do away with the mill and erect better works, or he has not the means to do so. He keeps on trying and trying, but without profitable results, and finally has to stop work, and the mine is known to be a failure—a fissle—good for nothing, a swindle, and so on. Of course nobody admits that it is the fault of management and want of better judgment. I have seen many mines in California in this way go to ruin, and you will find hundreds of mills and mines abandoned which would pay well if managed in a better style. Some few of such mines which were abandoned for years, were afterwards bought by parties for scarcely anything, and after a better style of work and sound management, had been applied, became a great success, and made the last owners rich men. I could give you dozens of such instances. Let me return to the working of the stamp mill.

As soon as the fine quartz pulp comes out of the mortars, through the screens, it should fall on to a large copper plate in front of the mortars. This copper plate must have the same length or width as the mortar, must be narrowed down in width to the size of the sluices, which carry the pulp along. The bottom of this front copper plate, as well as the sluices, must be laid on an incline, so that the pulp can be gradually washed along and floated over the same. These sluices must also be covered with copper plates. The incline must be such that the pulp, coming from the mortars (through the screens) must not run too fast, as it would carry the gold, and the amalgamated gold, escaping from the mortars too fast over the copper plates, and in this way the chance is lost to make this gold and gold amalgam adhere to the amalgamated copper plates. This pulp must not run too slowly, as it would otherwise stop and form a layer of the quartz sand, over which the after following pulp would run, and this way would prevent the chance of catching the gold and the gold and amalgam on the amalgamated copper plates. Such sluices should be covered with amalgamated copper plates at the length of at least 6 to 8 ft. These copper plates should invariably be loose laying inside the sluices, each copper plate not longer than 15 to 16 in., so that from time to time, at least twice a day, mornings and evenings, one plate after the other can be taken out, the gold and amalgam which adhered during this time be cleaned off on a separate amalgamating table, and such plate re-amalgamated with quicksilver and chemicals be laid back in the sluice. Having these copper plates laying loose in the sluices, enables one to take them out and go through this manipulation without stopping the work of the batteries in the mortars, and in this way saves time and gains work and results. After the quartz pulp passes through these sluices and over the copper plates, it should then be taken over and through other sluices, which are covered with blankets, so that the quartz pulp must pass over these blankets. These blankets have to be taken out, one after the other, and the deposit on the same washed off into a large tub, and then the blankets laid into the sluices again. The washing of the blankets should be done at least once every hour. After the pulp has passed over the blankets it runs out of the mill into a reservoir, where the pulp should settle.

All the blanket washings should then be worked in pans—amalgamating pans—for the purpose of getting the gold and amalgam which escaped from the mortars and which also escaped from the copper plates, and which to a great extent will be caught or saved on the blankets. If the pan work is complete all this gold will be saved here. The pan work is intended to grind the quartz pulp still finer, as the stamps in the mortars have pounded the same. This grinding process will free the small particles of gold which adhere to fractions of quartz, and also will free the gold from the film which covers the same, as nature has made the gold mostly and to a great extent covered with such a film and combined with other metals like iron, copper, and sulphur, so that such gold is not free enough to combine readily with quicksilver. Such gold would even float on quicksilver unless it is made free by friction, or in other processes by roasting. It is easy to understand that under such circumstances the use of the right kind of chemicals in the mortars, on the copper plates, and in the amalgamating pans will be of great help, but it is absolutely necessary not only to use the right kind of chemicals, but not too much of the same, as otherwise these would act as much to disadvantage as an overdose of medicine would act upon the human system. I speak of such use of these chemicals further on.

The quartz pulp from the reservoir outside of the mill, as well as the residue from the amalgamating pans, should then be worked, and concentrated on buddles, as these are used in Cornwall, and also in California. I call your attention to the annexed drawing of such a buddle made by myself. This buddle work requires very small water-power, only enough to turn the brooms sweeping over the surface of the buddles.

On these buddles most of the lost gold and the gold amalgam, also the lost quicksilver, is saved, also the very largest percentage of all the sulphurates contained in the quartz. This alone is a very great gain, as in most gold mines such sulphurates are rich, in a great many cases worth 50 per cent. and more of the free gold. These concentrated sulphurates should be packed in good strong sacks, shipped to Swansea, where they are bought according to the assay value, a certain percentage being deducted for working. The net result of such sulphurates are always more than 50 per cent. of their assay value. Each superintendent of a mine and a mill should always be able to make his own assays as well from the various parts of his mine as from the residues of his mill results, so as to be able to control himself and his mode of working. To have such assays made by outsiders is never as reliable, and does not give as thorough information to the superintendent as if he is able to do it himself. If he should be able to make an analysis of the ore so much better for the control of work and his workmen.

The thorough working of a mine, and particularly of a quartz mill, consists of constantly taking care of all small and apparently trifling repetition of work. I will admit that it is very tedious, but it is absolutely necessary, and unless it is done to the greatest extent the good result is bound to fall off. The superintendent should absolutely understand every department of the work to be done by his workmen, even his engineers, so thoroughly himself that he at any moment should be able to show his workmen how to do it, and at the same time he should explain to his men why he wants them to do the work in such a way, and in this manner make his men interested in their work, and make them think about what they are doing. The workmen will then respect the superintendent, and will not look upon him as a fault-finding and growling master, but will see in him the teacher, and consequently will like him, and rather see him come to them than go away.

Amalgamating of copper plates with quicksilver: The best plan of using copper plates in quartz mills is to have the copper electro-plated with silver, like forks and spoons. I have invented this way of plating copper plates, and introduced the same in Californian mills, and my recommendations of the same in the Mining and Scientific Press of Mr. Dewey, in San Francisco, had the effect that now all over California, as well as in other gold States, these plates are mostly in use. I am sorry that I at that time did not take out a patent for my invention, as this would have given me a large income. I arrived at this invention in the following way:—

The amalgamation of common copper plates with quicksilver, as they were used in gold quartz mills, always gave me, like anyone else, much trouble, as such plates very soon corroded, and became covered with such a slime of oxidation from the copper, produced partly from the combination with quicksilver, and partly from the nitric acid necessary to be used to combine the quicksilver with the copper, and to make it stay on the same—that I tried various ways of amalgamating the plates, and always failed to keep them in the best order, and clean. One day the idea struck me to pound a half-a-dollar silver piece as thin and flat as possible, and nailed this on to a copper plate, over which the quartz pulp from the mortar was running, and wiped a little clean quicksilver on to this thin piece of silver. I soon noticed the effect that the escaping amalgam from the mortar adhered most readily to this piece of silver, and also noticed that the surface kept most clean, and did not corrode when the surrounding copper plate, to which I had the piece of silver fastened, became as much corroded as usual. I also noticed that this piece of silver saved in proportion twice and more amalgam as the same size of surface of the copper plate.

After various trials, and always getting the same good results, I went to San Francisco, and induced the firm of Haynes and Lawton there, who were dealing largely in silver plated goods, which they imported, to build an apparatus in which they could electroplate some copper plates for me. I then used these plates in the quartz mill on the side of one sluice, in which I had the usual amalgamated copper plates, and had the very best of results, saving more than double the amount of gold amalgam. The publication of my results soon induced others to use the same kind of electro-silver plated copper plates. Haynes and Lawton built large works for it, and the consequence was that they also soon manufactured silver-plated goods like forks and spoons as made here in England by Mappin Brothers, and other Sheffield works; and this firm, as well as others who followed the manufacture, had very soon large and constant orders for my style of electro silver-plated copper plates for use in gold quartz mills. These plates keep entirely clean, do not corrode, save most of the gold amalgam lost from the mortars, need very little quicksilver, no acids, and keep a long time before the electro-plated silver is used off by dissolving, and then can easily be re-plated. This style of plates I recommend undoubtedly as the very best that can be used.

The copper plates to be fastened inside of the mortars in which the stamps work should not be electro silver-plated, but common copper amalgamated with quicksilver, because the continual blows of the quartz pieces by the fall of the heavy stamps on to the dies inside the mortars would very soon wear off the thin layer of electro-plated silver.

All common copper plates should be amalgamated with quicksilver in the following way, and should be kept clean by constant attention in brushing the same by hand with a common brush as used for cleaning boots, such brush being previously dipped in a very mild solution of sulphuric or even muriatic acid. Whenever and wherever I recommend now the use of any acids and chemicals please always bear in mind that too large a dose is a great disadvantage. My experience is that common workmen are very easily disposed to the over use of any chemicals, and also to use too much quicksilver.

A common copper plate should be first thoroughly scoured and cleansed by taking a piece of old blanket and pumice stone and fine sand, and by constantly rubbing the surface of the copper which you afterwards desire to amalgamate with quicksilver, so that the face of the copper becomes clean and shining. You might use as an assistance a very mild solution of sulphuric acid. Afterwards brush it thoroughly off with clean water. Have the following solution made at your mill. Mix one part of sulphuric acid with the same quantity of water; let this stand until it becomes cold, then mix it with two parts of nitric acid. Brush then the copper with this solution, and take some sand, soap, and pumice stone pulverised, and have it thoroughly brushed. Then have this repeatedly washed off with clean water. Then put a little quicksilver in it, and rub the same into the copper with a sponge fastened to a stick, and in this way cover the whole face of the copper plate with the quicksilver. Then brush your plate off again with clean water, so as to take off the superfluous acid and the possibly loose quicksilver. These plates are then ready for use.

It is also a desirable way of amalgamating copper plates by taking amalgam of zinc. The zinc amalgam is made by cutting the zinc in small fractions and placing it in quicksilver. Then heat the quicksilver gently, so that the zinc will dissolve. Have this rubbed on to the copper plates as before mentioned in the case of the quicksilver. The quicksilver to be used in the mortars should always have a small addition of zinc. Zinc might also be dissolved in muriatic acid, and the solution, much diluted with water, sprinkled into the mortars. Some sulphate of copper and common salt in solution with water is recommendable to be sprinkled into the mortars.

A good mixture for the purpose of amalgamating, and particularly the re-amalgamation of used copper plates, is to take a teaspoonful of quicksilver and mix with it 7 ozs. of nitric acid. After this becomes a solution mix it with six gallons of water, and then use this solution after the copper is cleansed off with pumicestone (pulverised) for the re-amalgamation. To put quicksilver on the copper plates for amalgamating purposes it is recommendable always to use a light solution of sulphuric and muriatic acid. This combines the quicksilver better with the copper. The quicksilver as generally bought is never clean enough for use at a quartz mill, and should always be distilled or retorted before use on plates or in the mortars. Have some sulphate of copper dissolved in muriatic acid, or in sulphuric acid, and mix a very small quantity with your retorted quicksilver. This will make the quicksilver more active, and more easily adhesive.

The feeding of quicksilver in the mortars during the run of the mill should be done from a small strong bottle, the opening on the top covered and closed by a piece of linen fastened by a string around the neck of the bottle, and in this way the quicksilver is sprinkled into the mortars, only a little at a time, all over the quartz surface inside of the mortars. The quantity of this quicksilver sprinkled into the mortar must be according to the richness of the quartz; but the millman feeding the mortars with quartz, and also with the quicksilver, can easily regulate and find out the quantity if he looks in front of the mortar on to the copper plate where the amalgam accumulates. If he puts his finger on this amalgam, and if he can easily move the amalgam, he must feed less quicksilver in the mortars. If the amalgam feels hard and dry under his fingers he must feed more. The superintendent, who has carefully to watch the feeding of quicksilver in the mortars, will soon know what quantity of quicksilver his gold ore requires to be fed with in the mortars, and accordingly fills the bottles for the millman, the contents of which has then to last for a certain time. Some gold ore wants more, some less, quicksilver in the mortars. This depends upon the quantity of gold, and then, again, mainly upon the fineness of the grain of the gold. To take the gold amalgam off the plates only thick and stiff pieces of India rubber should be used, never any metal. For the pan works also quicksilver has to be used, as well as acids, as I mentioned before. On the buddles no quicksilver or acid are used, as the work of the buddles is only intended to collect the loss of amalgam, quicksilver, and sulphurets.

The working of buddles I recommend highly. To each buddle one man only is necessary, and only a small water-power of one or

two inches carried from any distance in a sluice to drive the brooms which constantly sweep the floor of the buddle, so that the particles of sand so much lighter than the sulphurets easily float off. The feeding of pulp from the reservoir of the mill tailings is done through the feed-box into which the regulated quantity of water runs, so as to divide the pulp which goes from the feed-box on to the funnel on the top of the buddle. This is a sieve through which the pulp runs on the top of the cone, and from there the pulp divides equally, running down on the side ways of the cone upon the inclined floor, over which the brooms constantly sweep. Then the pulp runs off into the outside sluice and is washed off on the one side, where on the opposite side water runs in for the purpose of washing away the waste pulp, in the shape of sand and slime, on to waste ground. This pulp running off from the buddle is waste, and should contain nothing. To clean off the buddle the work is stopped. On the top of the cone and around the same on the inclined floor the particles of gold and amalgam and the sulphurates are deposited, according to the law of gravity, and are taken off from the buddle by a shovel. The superintendent will soon see how far towards the rim of the buddle sulphurates have accumulated, and according to his judgment he will have the outer part of these sulphurets and sand re-buddled, so as to save the sulphurets and have them mixed as little as possible with quartz sand. All the principal manipulations are soon learned. The whole buddle, built of boards, cannot cost more than 5*l*. or 6*l*.; even the two conical wheels included on the top, which are necessary to give the rotating motion to the sweeping brooms. The wheels are moved by the pulley on the side, which is connected by a rope or india-rubber band, or a small strap of any material with the other stationary wheel, which is moved by the above-mentioned small water-power. This buddle work pays always very well. I found that the best men to work such a buddle were always Chinamen, as they are invariably most systematic in their work. Any further informations which you may desire, either upon this subject or with regard to the treatment of silver ores, I shall give with the greatest pleasure. FRED. B. STECH.

London, Sept. 25.

COLLIERY EXPLOSIONS.

SIR,—The narrative of the accident at Lundhill Colliery, given last week, may be supplemented by describing the improvements made in the mine after the restoration of the doors and stoppings, and the clearing away of obstructions in the air courses. After the accident the furnace was still used for ventilation, but it was fed by fresh air, the return currents passing by a separate drift to the upcast pit. The doors were at the same time all doubled, so that a stoppage of the ventilating currents was much less likely to take place than with single doors. Lamps were used exclusively for lighting the mine after the accident. The measures taken to prevent explosions have had the desired effect, no explosion of moment having occurred since these were effected. The air was divided into two currents at the bottom of the downcast pit (as before the accident), but each current amounted to 35,000 cubic feet per minute, or a total of 70,000 cubic feet conveyed into the workings. There were seven districts at the time—1857—that is, seven bord gates, each with a system of banks in connection with it. The feasibility of giving to each of the seven districts a separate split of air was much discussed at the time; such an arrangement would do away with all the doors in the bord gates, crossings being required for conveying the return air over them, and regulators in the entrance to such returns for apportioning the same or a determinate quantity of air to each of the seven districts. Had this method been brought into effect the total quantity of air passing through the workings would probably have been raised from 70,000 to upwards of 100,000 cubic feet per minute. It was the practice at that time in some collieries to ventilate the whole of the workings by one current; most of those in the Barnsley district were ventilated by two currents. The advantage of further splitting the air will since then have been more appreciated in that district in the great increase of quantity obtained by this method, owing to the greater air space and less resistance to its passage which this method affords.

A proper record of the circumstances and the practice adopted in all explosions would be of great utility; when such disasters do unfortunately occur, it is requisite that the best mode of dealing with each case should at once be put in force, and that can best be done by a careful consideration of precedents of similar accidents.

The explosion at the Oaks Colliery occurred at 1·15 P.M., on Dec. 12, 1866. It was indicated by dense volumes of smoke issuing from the pits and a loud report. The smoke continued to ascend the downcast pits (No. 1 and No. 2) about five minutes. This stopped suddenly, then fresh air descended, At No. 1 pit the cage was damaged and disconnected from the rope. At No. 2 the cage was blown away and one of the couplings snapped. The rope in No. 1 pit was drawn up and was found to be injured. The damaged cage was replaced by a new one. About 2 P.M. a party of three explorers descended, who found several men at the bottom of the pit, all much burnt. There were drawn up at once, search was continued during the afternoon and night by over eighty volunteers. During the night they recovered eighty men and boys, only nineteen of these were found living. About 9 A.M., on the following day, Dec. 13, while three mining engineers and 45 others, volunteers, were in the mine, another and more severe explosion occurred. The cage at No. 1 pit was blown up into the head gear and remained there. The force of the explosion at the upcast pit blew several persons some distance away, engaged just then in lowering a thermometer into the pit. No change was observed until 7·40 P.M. on the same day, when dense smoke issued from No. 2 pit, succeeded by a great blast of wind, then smoke, flame, and showers of sparks were discharged. After this continued for several hours, the furnace pit and the No. 1 pit became downcasts. On the 14th, about 4·30 A.M., the signal bell was heard to ring at No. 1 pit. On this the saw-mill engine was fitted up with a gin rope, and a temporary pulley being placed over No. 1 pit, a descent was made by two volunteers; they, with some difficulty, reached the bottom. They found one man alive, and brought him safely to the surface. No other person was heard or seen. They saw a large fire was raging at the incline top, probably the timber and coal in the siding, which no doubt had been the cause of the shower of sparks ascending.

On the same day, after a consultation of viewers—as there was no probability of anyone being alive in the mine—it was decided to fill up the furnace pit and No. 2 pit, to such a height as to prevent the entry of air; at 8 P.M. smoke and steam issued strongly from No. 2 pit; at 10·50 P.M. the temperature of the air, 32 ft. from the top, was 70°. On Saturday, Dec. 15, at 1·20 A.M., the temperature was 74° at the same place; at 55 yards down it was 76°. At 4·45 A.M. there was an explosion at all the pits, first up No. 1, then up No. 2, and lastly up the furnace pit; at 5·10 A.M. there were similar explosions; at 9·5 A.M. violent explosions up each pit; at 5·30 P.M. another explosion came up all the pits, this was the seventh, and was accompanied with dense smoke; at 6·20 P.M. slight explosions at No. 1 and No. 2 pits; at 6·25 the ninth explosion, with smoke.—Dec. 16: Three explosions on this day.—Dec. 17: Two explosions, at No. 1 and No. 2 pits; the filling up the furnace pit was commenced.—Dec. 18: Three explosions on this day, the first a violent one; dense volumes of steam, smoke, and dust were discharged at No. 1 and No. 2 pits; none at the furnace pit.—Dec. 19, Dense smoke issued from No. 2 pit, indicating the existence of a great fire below.—Dec. 21: Furnace pit filled up 117 yards in height.—Dec. 24: It was decided that No. 1 pit should be filled up to the Melton-field coal, and that a scaffold be suspended in No. 2 pit, having a 10-in. wrought-iron pipe through it, the pipe to be carried to the surface for the escape of gas. On Jan. 7, 1867, the hanging scaffold was lowered by the winding-engine to its place, a little below the Melton-field coal: clay was thrown upon it until there were 24 ft. of clay on the scaffold. No. 1 pit was filled with spoil to the depth of 163 yards.

Readings at the pressure gauge at the gas pipe and the barometer were taken every hour, from Jan. 13 to Nov. 5, 1867. On Feb. 4 the water-gauge stood at 5·7 ins., and the barometer at 29·1 ins., with the valve open 1300 cubic feet of gas were given off per minute at the gaspipe. The pressure of gas was often higher than 6 in. water-gauge, but sometimes there was an external pressure; the greatest downcast pressure was 1·9 inch of water on June 25. The total upcast, or internal pressure, during the period of observations before given, was 6638·85 hours; downcast, or external pressure, 433·95 ditto; equilibrium, 4: total, 7076·8 hours. Observations taken in June, July, and August showed the temperature of the gas always several degrees below that of the air at the surface.

The change of pressure at the gas pipe did not seem to accord with the height of barometer, but upon the rising or falling of the mercury at the time. At 29·40, with a gradual rise to 29·83, external pressure continued for 28 hours, but while falling from 29·83 to 29·77 internal pressure continued for 242 hours; when the mercury rose external pressure again commenced. There were, however, a few instances where the reverse of this occurred; an internal pressure with the mercury rising and external pressure with its falling. It is evident the tension of gas in the mine was at one time greater than another, which may account for the discrepancy in comparison with the barometer.

The opening of the three pits seems to have been determined on by Nov. 5, and the working of clearing out the upcast pit was commenced, but in August and September No. 1 pit had been partially opened and explored, and the remains of several of the explorers who perished after the second or third explosion had been found. The recovery of the other bodies was a work occupying considerable time, owing to the difficulties that were encountered. The coal being of a highly inflammable nature had caught fire at the first explosion. Carburetted hydrogen gas being thus evolved furnished material for the second and subsequent explosions; 17 successive explosions having occurred before the pits were completely stopped up.

ENGINEER.

COLLIERY EXPLOSIONS.

SIR,—I read with interest the many letters which appear in the Journal weekly on this subject, both theoretically and practically. But I very much fear that unless science can overcome the laws of gravity, or natural ventilation is substituted for the present artificial means, they may continue to be written to the end of time. If we take, for instance, the scene of the late catastrophy, the Seaham Colliery, where the present system of ventilation appears to have been so near perfection as possible, and where no blame is imputed to the officials, or those under them, we find that there could not have been less than from 15 to 20 miles of return air-ways on the same level with the intakes, and in many places side by side with only a few inches of brick wall between, which would be blown out with an explosion, and ventilation destroyed. Now, although this system of ventilation was complete and ample under favourable circumstances, the danger of its momentary disarrangement was ever present. Thus a lightning of the atmospheric pressure, or a slack furnace, might admit of an outburst of gas, or a fall of roof, or other slight accident might interrupt the ventilation, and produce a most explosive mixture, which would only require the application of a light to cause an explosion, and to one of these causes the Seaham explosion is probably attributable. The statements of the living, and the written testimony of the dead, show that ventilation at the face of the workings was good, and continued so for several hours until vitiated by the deadly fumes from the locality of the explosion, and the many miles of return ways, which had no outlet.

There appears to be but two ways of remedying this state of affairs. First, to sink ventilating shafts at varying distances in advance, or to drive the returns in a stone drift, or an upper seam above the workings, and communicate by staples or winzes. In the latter case if an explosion occurred it would in a measure be local, and the force of it would be carried upward at the nearest staples, while the specific gravity of the coal and heated air would right the ventilation, even after an explosion, unless there was a fall sufficient to prevent a current of air from passing through, which I believe seldom takes place, but I presume the expense of this mode of working has prevented its being adopted long since.

Colonel Shakespear has an apt illustration in the latter part of his letter last week, but unless he can make his tide of fresh air drive the vitiated air in a return way above the face of the workings and the goafs I fear it will not be so easy to do, and would be liable to derangement. CHAS. KNEEBONE.

Bettws-y-Coed, Oct. 13.

COL. SHAKESPEAR ON COLLIERY VENTILATION—No. II.

SIR,—Many seem under the impression that ventilation by suction does not tend to lessen atmospheric pressure on the strata; but that it does so is easily proved, and I must maintain that not unfrequently, what between the falling of the barometer and the sucking of the fan or furnace, the pressure is reduced as much as ½ lb. on the square inch. Again, if a 15-ft. diameter downcast shaft, when empty, has sufficient area for ventilation that area must be insufficient when half the space is filled with cages, the effect of which is to risk for the time sucking more air out of the mine than goes into it, thus casing pressure and drawing gas from the strata.

Now, the object of this letter is to draw attention to the advantages of a system the exact opposite to suction—pressure; and I would deliver air under pressure of four or five atmospheres near about the face of the coal, let it expand and find its own way out of the mine, subject to direction by doors as required. Air compressors are no longer the trouble they used to be as to heating and freezing, all such difficulties having been overcome, and men are now known to work a mile or so underground in metallic mines with no other ventilation than the air from the drills worked by compressed air. An instance is before me of seven men working in a drift, only 8 ft. by 8 ft. and 1780 yards right away under a mountain, where not only is the ventilation good but the quantity is greatly in excess of requirements for ventilation alone. Assuming that each man requires 35 cubic feet of air per minute, there would be consumed by them per minute 245 cubic feet at atmospheric pressure, but the supply from only a 3-in. pipe might be about 80 times that quantity, which would be ample even in a fiery coal drift.

In illustration, say I want in my colliery 200,000 cubic feet of air per minute. To do that I would have four compressors, each up to 50,000 cubic feet of air when expanded, and convey the compressed air from them down a shaft by a 10-in. pipe, and then radiate from the bottom with smaller pipes up to near the face of the coal, where a 1½ or 2-in. pipe might be sufficient Such a system would introduce good air to the working places together with perfect ventilation, as the tendency would always be to exceed atmospheric pressure, and cause air to penetrate everywhere, thus checking the oozing of gas, and as the barometer fell more air could be driven in without the risk of artificially increasing the mischief as is now done by the suction of the fan or furnace, in addition to which the air would work all the engines below, thus avoiding steam-boilers underground. Suppose, under the present system of ventilation by the suction of a fan or furnace, there was to occur a serious injury, impeding or wholly stopping the intake air, a circumstance by no means impossible from fall of roof, and that the men about the fan or furnace were not immediately acquainted with it, as probably they would not be, then the air would be more or less exhausted throughout the mine, killing or injuring all hands. But if the ventilation was by pressure through wrought-iron or steel pipes this accident would not be of so much consequence, as the air would be forced in as before.

The question now arises, Could any injuries result from air accumulated under too great pressure? The answer seems to be that in the accident which occurred about four years ago at Tynewydd, in South Wales, "the shut-in miners"—eight men—lived for eight days under a pressure of two atmospheres, and found no disadvantage from it. I have a letter from a gentleman well acquainted with this subject telling me that within his own knowledge where the system is partially carried out the men specially remark on their improved health. From a misunderstanding of the laws of air there is a cry being raised for additional shafts to obtain more ventilation, but that idea is faulty in principle and beside the question. The velocity of the ventilating current is already often much too great. Less air, better distributed, would be a truer system, and that is what I advocate.

In carrying out this system the most improved compressors suitable to the purpose should alone be used. Lately I was using one which seemed perfect in its working and delivery of 30,000 cubic feet per minute. I strongly advise several small engines in preference to one of a large size. Of course, the system means expenditure of capital, but I must maintain that the beneficial returns would be ample, for while 1d. a ton would pay 10 per cent. on the direct outlay, the indirect saving would be equal to that or more.

A few words on lighting, in addition to what I have so often urged as to safety-lamps. Before now collieries have been fired from the naked lights about the mouthings at the foot of the shafts. All such lights should be prohibited, and electric lighting on an incandescent system substituted. J. D. SHAKESPEAR, A.M. Inst. C.E.

Great George-street, Westminster, Oct. 13.

GUNPOWDER IN COAL MINES.

SIR,—I notice in last week's Journal an intelligent and disinterested description of a method of blasting in coal mines, in which water cartridges are used in combination with gunpowder, the writer of which ("F. A., C.E.") I have no knowledge of whatever; but he has omitted to state that the invention is protected by Letters Patent, No. 3150, and, as his letter may convey the impression that he has given the process for the benefit of the mining interest, much inconvenience might be caused to me should this impression get abroad, and even legal proceedings be necessitated.

I, therefore, rely on your fairness—especially in a widely-read Journal like yours—to insert this letter to correct the serious injury my interests might sustain. It was my intention to communicate with the Journal when I was ready to supply the market; but this premature and unauthorised announcement of "F. A., C.E." has forced me to break my silence, and I may now add for your information that these safety hydraulic cartridges will soon be in the market. I beg to enclose you a circular of certificates from mining engineers and managers of quarries of numerous successful tests the invention has been put to. JAMES MACNAB.

Southampton Buildings, Chancery-lane, London, Oct. 11.

MINING IN ALGERIA—No. III.

NOTES OF A JOURNEY FROM DJIDJELLI TO BOGIE, CROSSING OVER THE DJIBEL HADID (OR IRON MOUNTAINS).

SIR,—Last week I left off in my Notes—No. II. on our return from seeing the great stalactite guano cave and untried lead lodes at the foot of Djibel Hadid.

Monday, May 2, 6 A.M.: After a good night's rest—bar fleas—Capt. Joe and myself, with my servant, went down to the river, and after a splendid dip returned and ate a good breakfast of cold fowl, coffee, and Arab "kous-kous." At 9 A.M., after kissing the Kaed's hand and promising to return before 7 P.M. for the grand dinner, our mules being ready, we proceed to travel up winding paths to the Arab blacksmith's forge, on the way to the iron mines. This forge is built of stone, at the foot of the hill, in a sort of grass platform, called Beni-Fourhall, and has been used for a century by the mountain Arabs. The Arabs bring the ore and fuel to the forge in bags, and smelt it, afterwards beating it into bars of iron, or any tool they wish to make. The tribe Kabili are the most clever workmen, and specimens of their work (which is truly wonderful, being all made by hand) can be seen in the Kensington Museum, and is daily regularly sold at the market and Jews' stalls in Alger. After leaving this forge and stone hut we cross the valley to another little plain on the top of a high hill, when it began to thunder, lighten, and rain. We took refuge in a house open at the top and both ends, and a small hole to get in by. This house is the chapel, and at the end inside is a small granite stone bench, hollowed out, with three small oil-lamps placed on it, which have been used by the "Marabou," or Mohamedan priest. Outside are many graves of Arabs, close to our path; the Arabs are always buried with the head towards the sun, and lying on their sides. We now stop for refreshment before going up the mountain. This hill is called "Ouled Nabits." Looking down a very fruitful valley we see the sea, and Bogie in the distance. I saw eagles, and very pretty birds. While they are finishing the meal and getting ready to start, Capt. Joe and myself went to see an Arab school. Sheik, San Benbelcassim; tribe, Cym Chwn. The row the jolly little Arabs, all dressed in white, made saying their lessons quite astonished Capt. Joe, who said, "I say, Mr. ——, 'tis just like our Cornish geese a-cackling." By the side of the school is a delightful garden, with splendid flowers and fruit—the hyacinth, orange trees, and white heath. Below us is the River Oued Gypsa (almost dry in summer, but now deep from the rains), up which (some 2½ hours' mule travel and ride from the sea and small unmade port of Masuria) is the great unworked copper lode and deposit, which I will hereafter describe. Sheik, Sleman; tribe, Beni Oulaed Ali, which means the children of Ali. There is a small mill by the river, close to this place, for grinding corn. On going back we find everything ready, and we mount our mules. Up the hill we go over a steep rugged road and path; the Arab mule is like a Dartmoor pony, never slips or stumbles. The Arab muleteers sing as we go along, and we now get into a black shale and dark looking country. We notice where the wild boar has been rooting up the ground; the boar is most destructive to crops here. The Sheik's name is Berkhaasem Ben Amar; tribe, Beni Marmi. The country now becomes of a dark reddish colour, with very little vegetation. Up the hill we go until we get to the iron plain, or a sort of pan or flat valley between the hills. Here is the great deposit of iron ore, acres and acres, in fact millions of tons of it! The ore is poor in many places, and does not appear to be very deep, it is in pockets varying from 6 in. to 6 ft. deep. Capt. Joe is simply in ecstacies of delight, and says, "Lord! Mr. ——, here is a fortune if we could only get it to the seaport." To build a railway, I believe, to pay is impossible; but a wire rope might be fixed and used, going from point to point across the valleys and down the hillsides to the sea at the future important port of Masuria. There is no doubt there is a fortune for someone some day here who will form a limited liability company with plenty of capital. We think it would pay and be possible, as there is such a quantity of wood forests between this and Bogie to obtain charcoal for smelting the ore on the spot. There is plenty of building stone near here. Leaving our mules and men, Capt. Joe and myself, with our interpreter, start to walk back down the north side of the hill, where we see the small River Kac-kar below us, rushing with white foam here and there over the rocks to the sea. The view is truly lovely and grand. A very superior fellow, Sheik Masande Benisa, shows us a primitive sort of turbine mill, used for grinding olives and corn. Near this and the River Kac-kar is the boundary of the circle of Djidjelli and Bogie. We now see a gypsum lode running from the Sheik's house down the hill about 400 yards, and it shows at surface about 100 yards wide. At the foot of this hill is the Roman town of Siama, with old walls, arches, and chimney-stacks; there are inscriptions on the key-stones. It is now 4 P.M., so we determine to go back and leave the copper lode for to-morrow. As we pass down the river Capt. Joe points out to me some very large stones of gossan, and the water in places is highly coloured, coming from the great lode far above us. By the path there are many little caverns with water running down through them, all have water-cress and ferns. We now see the white smoke curling up through the trees in the valley and village of the Kaed.—6·30: Having changed our wet things we are ready for the great dinner, and our interpreter announces the fact to the Sheik in charge. Bang! bang! goes about a dozen guns in honour of us (which makes Capt. Joe turn very pale, and think of his wife again at home). The Arab gun is 5 ft. long, with stock about 1 ft. It is now very dark, and the effect of all the village tent lights is very striking and pretty. We are shown by the Sheik into a large tent, ornamented by putting Turkish carpets all round the roof, or top, and on the floor. In the middle is a square, very rich, carpet opposite the pole, at the foot of which sits the Kaed. This tent is called the "Gourbi." For the Kaed to sit down to dinner with us is considered a great honour. We sit in front of the pole opposite him, with our interpreter, and the chief Arabs on the left; the musicians on the right. The Arabs are dressed in a white sort of tweed, made of wool, with a hood, and red leather slippers. We all sit on the carpet—no chairs, &c. The dinner is placed in the centre, on a low table, Arab boys being waiters. The Kaed is dressed in a handsome white burnous, a skull cap, called chechia, with the brema, a sort of woollen white cordage, twisted round his head in the shape of a cross. A bell now rings, and the first dish is served, called sherba or kissra, in a high stone sort of

vase; the second dish is called kous-kous, which we eat with wooden spoons, each taking a dip out of the dish in turn. The sherba is made of flour or semolina, mutton broth, kid, &c.; the kous-kous of semolina, dried hard wheat half ground, lentils, and broth made of fowls or kid, and Spanish peas. After dinner we have date fruit handed round in a large basket made of ribbon and dark straw, similar to the Welsh baskets. I sing an English song. Coffee and cigars, and the musicians begin to play. One plays a flute 4 ft. long, and the others holloa at the top of their voices a wild Arab song. "Lord! Mr. ——," said Capt. Joe, giving me a poke, "this yer is the most infernal row I ever yeer'd; 'tis as bad as Farmer 'Iggins a-killing his pigs down in our county." We now retire to rest, after a very long day, and intend going to see the copper mines to-morrow.

R. G. S.

FOREIGN GOLD MINING.

Sir,—I have read with much interest the strictures on gold mining contained in the recent letters of your correspondents upon that subject, which you have so judiciously placed before the investing public in order to repeat the warnings you gave in former times of enthusiastic speculation; therefore, following in the wake of the encouragement you have afforded for these expositions, I beg to call your attention to a notice in your issue of the 9th inst., in which I perceive subscriptions are requested to work for gold in some mining leases in the colony of Surinam (Dutch Guiana). It would appear that the vendor requires 5000*l.* cash and 35,000 free shares, or the amount of 40,000*l.* sterling, for the leases of a property, out of a capital of 50,000*l.* to be raised. Now, if this is not paying for promotion out of the pale of all reasonable proposals I should like to know what it means? I should think that 10,000*l.* would be a very small capital for a company to carry out such an enterprise in that Dulch colony, situated in the centre of tropical heats and dense vegetation, and to gather 50,000*l.* sterling worth of gold out of Surinham gravel, without counting on profit, with such an inadequate capital does sound very strange.

That gold exists in Surinam and in paying quantities no one who knows the colony will doubt; but 40,000*l.* as promotion, out of a capital of 50,000*l.*, is a large heap of gold already coined. Despite the good faith which the Dutch colonial authorities are supposed to exercise towards foreign companies in their colonies, I would advise parties before investing capital in their territoties to enquire, and have some satisfactory proof of that good faith said to be displayed by the Dutch Governments to those who have already entered into various undertakings in their colonies. Perhaps for the time being the British public have already launched out sufficient capital for legitimate gold mining in their own extensive possessions, and it is expected by many and hoped by all that the Indian gold fields may prove good investments for British capital. Under our own Government we have staple mining laws, which can be much easier understood than the shifting decisions of those Governments who have no mining laws, and whose officials have, in consequence, power to refuse to one and grant to another any discovery, without any consideration for the time and expenses incidental to the exploration by which this discovery was ascertained on the Government lands. We have no need of "Golden Keys" to obtain the rewards of our discoveries in our own colonies and possessions, which are free to strangers as well as Englishmen to develope.

Capitalist.

Oct. 14.

GOLD MINING IN THE DUTCH WEST INDIES.

Sir,—"A Late Resident in the Colony" still endeavours to keep his "incog," but if I were to remove his mask I am certain very few would be bewildered by his bearing, and he may depend that neither my clients or myself will take fright by his wonderful performances as a "British Barrister-at-Law" or otherwise. Unable to deny my assertions, all of which I can prove, he palms off the questions I put and fills his letter with bandy, which men of his class generally use when brought to bay. My clients, the Alliance Phosphate Company (Limited), owners of the Serro Colorado concessions at Aruba, are by no means alarmed at the power of the unfortunate companies named by "A Late Resident in the Colony," and when it suits their purpose they will commence action against the "terrible combination," or know the reason why. Until now "A Late Resident in the Colony" has had his own way, and he has been plentifully supplied with rope which will eventually entrammel his party of clients.

As to the phosphate on the lands of my clients, I am not a judge whether the game is worth the powder and shot, but an eminent authority on phosphates, who visited the property, has remarked—"That after a shipment of 25,000 tons of phosphate of lime of fair marketable quality, say equal to 75 per cent. (and for whole cargoes no better average result can be fairly obtained), that the quality of the phosphate then remaining will be no better than the Navassa phosphate, which it resembles by containing such large proportionate amounts of iron and alumina with too small a quantity of carbonate of lime for the general manufacture of phosphates. It can certainly be argued that Serro Colorado can produce a good quality phosphate containing in some cases over 80 per cent. of phosphate of lime, and it is certainly known that the cargo of phosphate excavated from the Government lands near Serro Colorado proved very rich at Aruba, and so did some samples in England, but the cargo ex Lillesand, shipped with such a flourish of trumpets, dispelled some illusions anyhow. Quietness on this subject seems to have been the policy, however galling it may have been to the intreested parties.

My nameless opponent mentions that the Aruba quartz proved very rich at Aruba—1½ oz. of gold per ton, by nearly 1000 assays made on the spot, What enchantment! I do not believe that the average quality of Aruba quartz contains ¼ oz. of gold per ton, and what Messrs. Rule failed to do (and they are clever practical gold quartz authorities) I am quite certain cannot be effected by any number of such persons as "A Late Resident in the Colony."

In every enterprise we find certain interested parties who have nothing to lose, and their livelihood to gain. These parties by different schemes do not hesitate to make statements, irresponsible as they may be, to obtain their own private ends. I venture to say that in England and elsewhere many concerns are kept alive by sensational reports from time to time which are never verified by the results obtained, until finally the shareholders, who have really invested (say) hard and honesty earned capital, become disgusted at last, and such enterprises are wound up at great loss to themselves, but with gain to the promoters, and even to some of the employees.

To the Aruba Gold Mining Company, and to the Aruba Agency, perhaps I might say there is nothing like pluck—for I wish them success at their gold mines—quarry or mine your rich gold quartz, ship your bar gold, and you need not forget to advertise the number of ounces of gold; but then state the cost of obtaining each consignment of bar gold.

To the Aruba Phosphaat Maatschappy I would say, lay down your miles of railway, spend your working capital, raise then further capital to place the deposits of phosphate in working order, pay the Government a royalty of 23 guilders—about 39s.—per register ton, and when you fail to clamber the pole so well greased, and no doubt you will clean off some of the grease, then I will try and clamber and secure for my clients the leg of mutton—if there be any leg of mutton to reward our efforts. The pole is too greasy yet awhile for me, but the parties who may sell the phosphate for you will be sure of their selling commission without in any manner risking a single hilling.

To "A Late Resident in the Colony" I would ask again—1. Is it true or not that one of the articles of the phosphate concession reads thus: "The Colonial Government is not responsible for any claim which may arise between the concessionaire and the holders of other concessions of whatever nature they may be, and indifferent under whatsoever circumstances they may have been granted?"—2. Is it true or not that another article of the contract runs as follows: "The concessionare is bound to guarantee the Government for all the consequences of possible lawsuits which may be entered against the Colonial Government on account of and in consequence of this concession?"—3. Is it true or not that these conditions have been made by the Government in view of the claims of the landowners or holders of the concessions for purposes of agriculture? To which three questions I now will add—4. Is it true or not that the Colonial Government compelled the concessionaires to give good security of 15,000*l.* before they were allowed to complete such contract?

A single remark to close. To each of the statemenls contained in my former letters. "A Late Resident in the Colony" has but one reply—"It is not true," just as a criminal pleads not guilty on all charges brought against him. It would be imposing on your kindness, and on the patience of your subscribers, were I to prove that all "A Late Resident in the Colony" pleases to call untruths are nothing but undeniable facts. One instance will suffice. "A Late Resident in the Colony" says in his last letter—"It is not true that both companies are seeking more money." Now I have before me the Supplement to the *Mining Journal* of July 31, 1880, which contains the report of a general meeting of the Aruba Gold Mining Company held on the 23rd of same month. I must acknowledge I am but a very poor hand at the English language, and therefore I should like to be instructed what is the meaning of the resolution "That the capital of the company be increased by the issue of new shares to the aggregate amount of 25,000*l.*," &c. This in regard to the Gold Mining Company. As to the Agency Company, I read in the speech of the chairman—"The Agency Company are now proposing to increase their nominal capital from 20,000*l.* to 30,000*l.*" "It is not true," "A Late Resident in the Colony," continues, "that the money to be subscribed is to be used in paying off mortgages." But may I ask whether the money is to be used to further develope the Aruba Mines? The speech of the chairman will give us the answer to this question—"This company is in debt in round figures about 20,000*l.*—It is to remove this indebtedness that the plan contained in the resolutions is proposed."

And now a question to the general public. What is to be expected of the truthfulness of "A Late Resident in the Colony" in regard to facts which have taken place in the far West Indies if in regard to facts taken place in England he dares to deny the truth to an English public who, by a simple quotation, can be convinced of the exactness or my statements?

A. M. Chumaceiro, Az.

The Hague, Oct. 12.

INDIAN GOLD MINES.

Sir,—In reply to the correspondent in last week's Journal asking why the South Indian should not be on a par as to value with the shares of the Devála-Moyar, I would say the question is very easy of solution. The South Indian and Glenrock Companies simply have the right to mine over a given area on other peoples' properties. They, therefore, strange to say, own no land or timber, have only the right to use the roads and water upon certain conditions, and are bound to make compensation for any damage they may cause to the plantations of coffee. In addition to all this, the latter company has to pay a royalty of 10 per cent. on the gross profits. Now, the Devála-Moyar Company possess, in addition to the mining rights, the land, the timber, water, roads, and coffee plantations, and, therefore, can work without let or hindrance, or fear of compensation claims. It is certain that the uncultivated land will become very valuable (simply as land) as the gold mining industry is developed.

A shareholder in the South-East Wynaad Estates and Gold Mining Company might well ask the question that has been put by the South Indian shareholder, and to him the answer would be quite another thing. The South-East Wynaad was one of the first in the field, and, therefore, was enabled to purchase outright 2536 acres, including the coffee and cinchona plantations, for 60,000*l.*; and this includes the mining rights over reefs concerning which Mr. Oliver Pegler writes in his last report: "I do not think that in any portion of the country (taking a given area) a greater amount of auriferous quartz could possibly be met with than on the estates of this company."

The Devála-Moyar, coming much later into the field, paid 132,000*l.* for 2055 acres only. Why the South-East Wynaad shares do not rank higher on the market than Devála-Moyar would be a mystery, were it not known the first-named company stands without the influential agency of names both at home and abroad to keep the price up. It appears to me, therefore, that the South-East Wynaad stands in a far better position than any company yet brought out, and for *bona-fide* investment should be selected.

I have not the slightest doubt that the Indian gold fields will prove a great and grand success, both for the companies who have not purchased any property at all, and most certainly for those who have bought such extensive plantations outright. We find that the engineers, both from England and Australia, who have visited the districts without exception declare that success is certain; it is time, therefore, that the British public should come forward with their capital in full confidence to develope this wonderful new industry.

E. K.

RUSSIAN COAL FIELDS—SALT DEPOSITS.—No. V.

Sir,—From the scene of my last communication we will now wend our way southward, sleighing as far as Wyborg, and thence taking train to St. Petersburg, afterwards continuing our journey *via* Moscow to the Ekaterinoslav Government for the purpose of examining the salt deposits, it seems strange that in a country so rich in this mineral as Russia is that her merchants should be obliged to make up the very large annual deficiency of demand over the production in the country by purchase from England and from the famous salt mines in Austrian Poland, called Wielizcka, near Cracow, for the west and middle part of Russia as far as Nijni-Novgorod. Formerly it could be understood that this arose from want of communication and from a want of the spirit of enterprise and energy, and a feeling of indifference on the part of capitalists, who preferred to content themselves with an easier and possibly enhanced income by turning over their capital in the more exciting but far more hazardous speculations upon the Exchange, or lending their money to their less fortunate countrymen, at usurious rates of interest, and foreign banking transactions—it is only within the last few years that legal interest was reduced from 9 per cent. to 6 per cent., at which rate it still stands. A merchant obtained a quicker return for his capital by sending his money to outside countries who were already producers of the article he required than by the comparatively slower course (which would vastly more than recoup him for the loss of time) of producing those very commodities in his own country. So it has been in the matter of salt, not remembering that its production in Austria is a Government monopoly as in Russia, and has to pay the Austrian tax before leaving, and the Russian tax on entering, and that by obtaining salt at home they would be profitably employing their own people in mining, thus causing large sums of money to be circulated through the country and return to their own pockets through many unexpected channels, and at the same time be paying no more for salt than to the foreigner, especially that communication is now being so rapidly opened up.

Russians are eminently an imitative and emulating race from the highest to the lowest; no one can be in the country without observing how quickly they imitate more advanced countries in all that is worth learning, and strive to excel in whatever they undertake, and do in some instances, but they are far from being good organisers or initiators of new commercial enterprises, and require the knowledge, capital, and tact of the Western nations. In Russia are found large deposits of salt. Firstly, as in the Island of Tcheleken, in the Caspian Sea, where as I have noted in a previous letter are found large deposits; these are all on the surface and in cliffs, and are quarried, they are in layers of about 4 in. in thickness, layer upon layer, each formed at different periods, although nothing more than the merest film of sand or other mineral matter is between just separating them; the salt is rather of a dirty grey colour, and which, of course, for table use requires refining. Secondly, as in the Ekaterinoslav Government in the Bachmut and Slavernsk districts, the deposits are under the surface and are mined. Thirdly, as Lake Elton, which is constantly replenished by subterranean springs, deeply impregnated with salt as if springing from salt deposits underneath (from constant exhalations going on which are nearly equal in volume to the springs), the water becomes so thoroughly saturated that when drawn into evaporating tanks it speedily crystallises, but which process, of course, can be accomplished much quicker by artificial means. Layers of salt of considerable thickness can constantly be gathered on the shores of the lake in an ordinary way.

The salt deposits in the neighbourhood of Bachmut are mined, but are all more or less tinged with iron; the rock-salt from these is not much extracted in a crude state, but the brine is pumped out and converted for chemical uses, and salt for such purposes is exempt from tax. The deposits in the Slavernsk district are of the purest kind, one I know where there are six seams of rock-salt, and the stratum between each is gypsum. The first two are tinged considerably, the third slightly, as well as the gypsum; the remaining deep ones are pure as the driven snow. The first and thinnest seam of salt is 2 fms. in thickness, and the deepest and thickest seam is 7 fms. in thickness; the gypsum over and between the last three is perfectly white statuary alabaster. The last seam of salt lies upon a stratum of shale immediately upon a stratum of the coal series, and has been bored to touch the coal. This class of salt can be used for domestic purposes simply ground to fine powder, and large contracts can be made for its use in rough lumps for sheep purposes. It must be remembered that the vast steppes of Southern and Eastern Russia, with those of the Great and Little Kirghis, afford an almost unlimited area for breeding sheep, and large flocks are to be seen everywhere as you progress through the country. Without the slightest doubt a million poods, or about 45,000 tons, per annum in one steppe must be required for sheep purposes alone, and probably very much more; then, in addition, there is the supplying the demand for domestic use and also for chemical manufacturing purposes, and if a large and regular supply could be counted upon there are not wanting people to come forward and erect fresh chemical works who would not embark in salt mining through not undersanding it. The salt can be produced—paying all expenses of every description, including the Government tax upon all except for chemical purposes (which is exempt)—at 13 copecks per pood (1 pood = 36 lbs.), which at ordinary lowest selling price of 23 copecks per pood leaves a handsome margin for profit; that for domestic use is sold at a higher price, which equally pays for the extra cost of grinding; and that for chemical purposes is sold in still larger quantities than for sheep, but somewhat less in price, minus the tax, so that the price stands about 18 copecks per pood; thus with the expenditure of about 25,000*l.* capital a splendid and really non-speculative income can be derived therefrom, with regularity and increasing annually. For the guidance of your readers 100 copecks make 1 rouble.

This is the most advantageous moment for investing capital in Russia, as now roubles can be purchased at the rate of 2s. each; next year it will be seen that the exchange will rise to 30d., so that capital invested now can be done with greater advantage than by delay, coupled with the benefit derivable upon the increased exchange rate when the profit on an enterprise is required to be remitted to this country. The value of the rouble then having enhanced more sovereigns can be purchased for remittance with the same number of roubles, and as the whole business in the country is transacted in roubles the exchange value does not affect the internal mechanism of the business until the moment arrives for remitting from time to time.—*London, Oct.* 8.

Veritas.

FLAGSTAFF MINING COMPANY.

Sir,—Permit me to intimate to my fellow-shareholders in the Flagstaff Company that in my opinion their prospects are rapidly becoming brighter. Our indefatigable chairman, Prof. Vincent, to whose continued exertions the existence of the company to the present time may be said to be wholly due, is, I understand, again actively engaged in the formation of a syndicate for re-purchasing the Flagstaff Mine. I am also informed from a reliable source that the present movement is supported by a number of very influential gentlemen in London, who withheld their adhesion from the former scheme, the present basis being of a very popular and taking description. I think we may all depend upon it that, so long as our Chairman is at the helm of affairs regarding the syndicate, that both share and debenture holders will be well taken care of respecting the future. I will close by repeating my former advice to my fellow-shareholders—that all should stand firm to our directors and the Flagstaff committee, and all will be satisfactory in the end.

Oct. 15. A Large Shareholder.

MINERS' WORK—AMERICA AND CORNWALL—No. III.

Sir,—I think the cage the best means of lowering and raising miners to and from the mines.—1. Because it occupies the least of the miner's time in getting to and from his work.—2. Because the non-useful work as at present done by miners—climbing ladders, &c.—would be done by steam or water power where applicable, enabling the miner to start to work in the morning quite fresh, with that much more work in him, and all the more time to do it in; and he could work much harder through the day, as he would not have to think of his long climb to surface again after his day's work was done. A miner's labour should be wholly expended on the face of the rock, not in the useless work he is called on to perform in Cornwall; and when this is properly attended to Cornish miners will be able to "work harder" than they do at present. The Comstock miner not only works usefully more hours than the Cornish miner, but he does more useful work in a given time, independently of his working harder at the same time. Another brief sketch or two will be the best and easiest method to illustrate this. Take, for instance, shaft sinking. In Cornwall two—perhaps three—men loosen the rock, no matter whether with pick or powder, shovel it to one end of the shaft, shovel it again into a kibble, and hoist it themselves by windlass from 2 to 10 fms. In the Comstock Mines four, five, or six men loosen the rock, shovel it into the kibble or tub, when it is hoisted to surface by steam-power. In driving levels in Cornwall the miner loosens the rock, then shovels it—sometimes twice—back to a pile, then shovels it again into a wheelbarrow or car, and takes it to the shaft. The Comstock miner loosens the rock, shovels it into a car, and takes it direct to the shaft. And the same system of work is carried out in the stopes, no more useless labour being performed than is absolutely necessary. I will not say that a miner's time in Cornwall can be utilised to the same extent that it can be in Nevada, but this I will say, that I think miners in Cornwall might give at least 50 per cent. more useful labour to the mines than they do at present.

I now come to consider the most serious obstacle in the way of the Cornish miner relative to his working harder than he does—the present system of letting contracts. Until this is done away with, and a new system introduced, it will be useless to think of the miner working harder than he does, whatever changes may be made in other respects. Every Cornish miner knows that if he wishes to work long in a mine he must not work too hard. If he works hard one month, and gets an extra pound, he has to work for two or three months after for about one-half the money, because his price is cut so as to average the wages; and, as they say in Cornwall, "steady wages for a family," so they work accordingly. How often has it been remarked by committee men, and at mine meetings, "These tutworkmen made a good thing last month, Capt. So-and-So; you really must be a little more particular in your prices." What is the captain's reply? "Oh! these men were all leaving for America, so they thought they would work harder, so that they might have an extra pound or two to take with them." Had it not been that they were going away, and worked harder like that, they would not have earned more than the average wages. This speaks for itself; all to the miner to earn more money, and he will earn it at the same price per a fathom of ground as he is paid under the present system. Although Comstock miners get such big pay they are not much better paid than Cornish miners are for the amount of useful work they do; and were the miners of Cornwall placed to work there under similar conditions to those of Nevada, there would not be so much difference in their wages as a great many imagine there would be, without increasing the cost per fathom of ground worked. Give miners the same prices per fathom as they are at present being paid, a long stent—say, 10 or 20 fms.—and give them the same facilities for utilising their time during their so-called working eight hours as miners have in Nevada, and they would be very hard competitors with any boring machines that can be introduced into the small levels peculiar to Cornish mines. In my opinion the future development of mines in Cornwall is not to be found in the use of boring-machines, because they will be found too expensive for small drivings, &c. Let mine owners and mine managers turn their attention to the development

of the power of that machine (man), and they will find it the most economical in cost, and not far behind the other machines in point of time.

A Cornishman.

LODES—HOW ARE THEY FORMED?

Sir,—I was much pleased with Capt. Rutter's remarks on mineral veins at the West Seton meeting last week. This mine, twenty years ago, was very rich for copper, and in 1860 the lucky adventurers pocketed 27,000*l.*, and the year before 20,000*l.*, the lode in many places being worth more than 100*l.* per fathom.

Now, however, at the deeper levels the lode is producing large quantities of tin. Consequently, an important question relative to the economical working of lodes is where do these ores come from? Do they come from the bottom or the side? Copper and tin are both good gifts for the use of God's creatures, and if any new light can be thrown on the phenomena of their strange occurrences much time and money will be saved. It seems to me from all I can gather that lodes are formed by watery mineral solutions coming from the sides and not from the bottom. Surely some of our valuable and intelligent Devon and Cornish miners, who have the means of studying almost every kind of rock, can supply a few stubborn facts, and thus help to untie this hard knot, and by these means "do the State some service."

An Old Amateur.

Exeter, Oct. 13.

TECHNICAL EDUCATION, AND STUDENTS OF MINING SCHOOLS.

Sir,—Permit me to say a few words in defence of technical education, and students of mining schools, who in the opinion of your correspondent, a "Practical Miner," are unfit to be trusted with the management of mines.

It would, perhaps, have been better had a "Practical Miner" been qualified to discuss the subject which he has attempted to handle, for as it is his literary effusion simply shows violent animosity, coupled with entire ignorance of what he is talking about, and the violent tirade with which he favours us appears to me to be the result of his having been made unpleasantly aware of his own deficiences by one of the students, he affects to dispise, possibly the Freiberger to whom he alludes.

Disregarding for the present anything of a personal character which has appeared in your columns, and weighing the relative advantages of theory as opposed to practice, I concur with Mr. Halse in holding the same opinion as those who are qualified to estimate the question in all its bearings, that theory without practice results in mismanagement, whilst practice without theory is scarcely better, and that the mine manager of the future will be a man of education, with a solid groundwork of theory as a basis to start upon, and subsequent experience and practice to direct him in applying it to the best advantage.

I am proud to acknowledge myself as one of the boys who a "Practical Miner" so flatteringly alludes to, who has both graduated at the Royal School of Mines in London, and who has subsequently studied at Freiberg; and I think that anyone who has the means of judging will acknowledge that though London is deficient in offering facilities for its students to study mining in its practical form, the same thing does not in the least degree apply to its sister academy in Saxony, and on that ground alone it is as unjust as it is absurd to characterise all mining students as being unpractical; and whilst there are few men who start into mining who do not first master the practical side of the question, either at Freiberg or at some other suitable mining centre, it is possible that the disrepute into which our class has come is due to some of the exceptional men who have been foolish enough to suppose that a mere academic course would at once fit them to discharge the duties of their profession.

Then, again, it must be borne in mind that there is a wide difference in the students themselves. There is, as might be expected, a section who are either too idle, self opinionated, or incompetent to work; and by neglecting the opportunities which are offered them, bring discredit on their friends or contemporaries; a class, again, who willing to work do not get work properly to acquire information; and a prejudiced miner, like your correspondent, when brought in contact with one or perhaps two of the above types will sweepingly condemn every person who has received a scientific education. But let me tell him that there is a class of men growing up, and daily multiplying in number, who have a sincere love for the work in which they are engaged, and who, regarding mining as something more than underground quarrying, will some day raise it to what it deserves to be, a brilliant profession, which will hold its own with civil and mechanical engineering, and vie with them in the intellectual as well as practical culture and refinement which following them demands. I have no pity for people like your correspondent, and such letters as his are usually the result of the same motives that prompted the imprisonment of Galileo, because he propounded the theory of gravitation, and the violent opposition which machinery as opposed to manual labour at first encountered. Small minds and ungenerous natures when made to feel their own incapacity are always the first in opposing progress.

It may astonish a "Practical Miner" to learn that the students in the Freiberg Academy are obliged to make a practical course in the mines, and duly qualify in it, before they are eligible for examination; and many of them are quite as familiar with mines and mining as he can be, with all his experience. A mind accustomed to weigh facts and estimate causes can often deduce results in a few hours which the untutored intellect will take years to arrive at. Hence, I suppose, the necessity a "Practical Miner" has laboured under of spending his life in using the pick "as a thoroughbred miner uses it." Although I must own I fail to see the direct benefit he derives from such an admirable accomplishment, unless he had to run his mine with his own hands, and the concern objected to the use of boring and gunpowder, notwithstanding that it is the only method (the use of bore machines and fire setting excepted) I have ever seen of winning a lode. But making all due allowance for the eccentricities of the use of the pick, the idea of the manager testing the working capabilities of a lode by working upon it himself is worthy of being immortalised by Punch.

The time of a manager of a German mine is of more value than to be wasted in that fashion. He resorts to Erzlagerstatten lehre, a science (that of ore deposits) which a "Practical Miner" has doubtless never heard of (although Von Cotta and other celebrated authors have written a number of works on it), and which if unacquainted with stamps his knowledge of veins and their contents as about evenly balanced with that of surveying. With regard to the latter subject I am curious to know to what degree of accuracy he claims to attain after six hours study, as in Freiberg it would demand at least six months of undivided attention; but if his knowledge is confined to the dial his statement is not so wonderful, for we look upon it as an instrument only fit for old women; and if he imagines he is a surveyor when he can use such a toy his ideas and his survey will be on a par of correctness.

Your correspondent is, however, most amusing when he remarks, with charming *naivete* "I require no sympathy from your correspondent (Mr. Halse) on the score of ignorance relative to things connected with mining, for I am perfectly conversant with all the school theory," and I have no doubt Collins's Elementary Text Book on Mining has done him great service; while such standard works as Lottner Serlo on mining, Gaetzschmann and Rittinger on ore dressing, Sickel on mine timbering, Jacinstey on ventilation, Hauer on water engines, and others which deal with the various branches of scientific mining, occupy an equally prominent place in his library, I leave it to himself to answer, but this is certain, that be that as it may, they ought to be there.

Whatever the prejudice in Cornwall may be against theory, it is an established fact that the managers of German and American mines are chosen not from practical miners but from one of the academies of Freiberg, Clausthal, Przibram, London, or New York, and where the two classes are brought into opposition it is the former who go to the wall. I had an opportunity of observing an instance of this only a few weeks ago. A well known Cornish company had attempted to run a tin mine in Bohemia, with a so-called practical manager on their own system, and the result was ruin, blunders palpable on every hand to any one at all acquainted with German mining.

Why is it so many insignificant German companies can float when the best concerns in Cornwall scarcely keep their heads above water? The solution is simple. It is the work of the so-called practical miner. He is very bold at a distance, but let him be brought into contact with one of the men he affects to despise and he betrays anything but a desire to fight. Let him rather read his own effusions in a Cornish bar room, where he can have the gratification of creating a sensation among the miners, for outside the circle I doubt whether it can create anything but a smile.

For all practical miners who though anxious to advance have been denied the opportunity I have the utmost respect, but bigoted ignorance only commands my contempt.

Nemesis,

Oct. 5.

TECHNICAL EDUCATION FOR MINERS, AS APPLIED TO PRACTICAL MINING AND MINE MANAGEMENT—No. II.

Sir,—A wise man said, "Bring up a child in the way he should go, and when he is old he will not depart from it." It may now be said teach a miner that which will be useful to him, and when he stands in need of the information so imparted to him he will find it as good as gold; but gilt him up with a lot of technicalities, and these, though making a good show of him for a time, will by-and-bye rub off, and leave only the base metal visible. The only good that either himself or others will ever derive from it will be the little spots of gilt which remain in hollow places—*i.e.*, the little which was really practical in what has been taught him. Then why not teach the practical, and leave the theoretical and technical.

Perhaps a few words of explanation as to how I apply the terms practical and theoretical would be in place here, or it might be imagined that I think the practical may all be learned in the mine. As far as the working miner requires so it can, but when he aspires to become a mine manager then something else is required. In considering the sciences of geology, mineralogy, and chemistry, I take them to be divided into two parts each—practical and theoretical. Wherein does the practical differ from the theoretical as applicable to mining? I answer this question as it appears to me in every day life, and I have not the least doubt the same thoughts have occurred to others. I will take, first, geology. It will be understood I apply these remarks solely to metalliferous mining. I leave to others their application elsewhere. To the professional geologist belongs the theoretical. I leave to him to determine the position, thickness, location, and order of the different strata composing the earth's crust. I leave to him to search for and record the position of the different fossils found in each distinct order of rocks. I trust to him to give them their scientific import and technical names. He only has time to go into such matters to study which he has spent the best years of his life. Practical geology, as being useful to the miner, I consider to be this—to know the names (common, not technical) and appearance of the different rocks in which different mineral lodes do or are likely to occur. He does not want to know whether it belongs to the Silurian or Cambrian age; he wants to know whether it is known to contain mineral or not. As far as my experience teaches me it would be useless to expect to find gold veins or tin lodes in limestone, and it would be equally absurd to look for copper or lead lodes in the chalk formation. It matters not to the miner what the rock contains as long as it does not contain any mineral that he may sell at a profit over working expenses.

My plan for the education of the miner would be this—with a well-selected collection of specimens of the different rocks which are known to contain different minerals, and well-arranged diagrams in conjunction therewith, reject all technicalities and scientific details, teach him that granite is granite, and what minerals are found in it, and how they occur in different classes of granite, &c., teach him how to distinguish one kind of rock from another, and this cannot be done in any way better than a lecture on it when he has a piece of the rock in his hand. The remembrance of a scorpion's sting on your own hand remains more vivid in your mind than all the substance of all the lectures you could attend on the subject of what others have suffered from it. The same course should be adopted with mineralogy. The miner wants to know a mineral at sight. It will be of no benefit to him to know that the angle of a certain crystal measures so many degrees, neither does he require to know anything of minerals that are of no commercial value; his eye requires to be educated to the appearance, and his hand to the feel, of workable minerals; he does not want his head to be muddled with an incongruous mass of technicalities, and this can only be done by ocular demonstration and a thorough explanation of the mode of occurrence, its appearance under different circumstances, &c. So with chemistry. The miner does not require to know that nitric acid is a compound of nitrogen and oxygen, or that its formula is $NO_5 \times HO$. He only wants to know that it is nitric acid, and how to prove it to be so. He does not want to know the chemical changes that take place in a chemical experiment, or testing a bit of mineral, or give a technical description of the same; enough for him to know the visual changes which take place; enough for him to know that in a certain acid solution of a mineral or metal certain agents show certain changes, and how to apply these changes to his requirements. I feel confident that the sooner technicalities are banished from the education of the miner the better for the prosperity of mining; and I am sure that lectures based on this plan would be a great deal more pleasant to the working miner than as they are at present delivered to him. He would understand the whole thing better, and would prove of more use to him in after life, because the information would be more firmly impressed on his mind than it ever could be when couched in technical phrases.

It is a recognised fact that, with but few exceptions, a trade is learned easier and better in youth than in after life, so there is no time like youth to learn mining, and then, also, is the time to teach him anything else appertaining to it; when he has the cares of a family on his head he has not the time to attend to it. A mining education grounded on this system is, I think, calculated to make the unprincipled man think more of his honour and integrity, whilst it would give the honourable and upright man a strength and desire to combat any demoralising influences which might be directed against him; while, on the other hand, a technical education would make the latter waver, and make the former more egotistic, bigoted, and ever ready to pamper to anyone who would pay him. And the sooner mine investors—I say nothing to speculators—realise this and act on it the better it will be for them and everyone else concerned. They know now that if they are to have their mines managed and worked honestly and properly they must employ the "gold" of miners, although it is very hard without testing sometimes to distinguish the pure "gold" from the "gilt." There are other things which I consider as necessary for a mine manager to be acquainted with as the above, if not more so, which I will write you in a future letter.

Gold not Gilt.

TECHNICAL EDUCATION FOR MINERS.

Sir,—Your correspondents generally give an implied assent that technical knowledge is useful, especially if self-acquired, but immediately technical education is mentioned they jump to the conclusion that knowledge acquired in a technical school renders the recipient totally incapable of applying it practically. This is to be regretted. Those who have studied in a technical school, while recognising its many grand advantages soon learn that wisdom is not inculcated coequally. It would also be foolish to suppose there are no self-educated practical men, who by a courage mental and moral have forced themselves forward in their profession; men whom perhaps a technical education would have been more detrimental to than otherwise. It was not unfrequently this adverse circumstance acting as an incentive which developed that vigour of mind making them exceptional. Practical men there are, have been, and will be. They are men who have, so to speak, deduced a technical education for themselves. But it is not for that class of men I infer technical education is so earnestly advocated. There is another class of practical lads, or young men, who are perseveringly intelligent, who possess an average rather than superior mental ability, and who are willing to suffer immediate privation with the hope of future reward, who desire to be educated primarily for its implied advantages, and ulteriorly if they are so qualified that they may occupy in mining a higher position than they and their fathers occupied. The saying "an educated man has a fortune within himself" is perhaps true, but the young artizan who interprets it to imply wealth may sorely repent it fallacy. It was to this perhaps Professor Huxley referred in his inaugural address when opening the new Science School at Birmingham, the munificient gift of Sir Josiah Mason. Its general import was the son of the capitalist and the son of the artizan may henceforth be educated side by side in this institution, and it behoves them not to forget their social stations. Nothing of a class antagonism was intended. There is an implied and even agreeably social understanding between the students of technical schools. The professor doubtless referred to that period when the course is completed, when the son of the former perhaps enters the establishment of his father in an official position, while the latter returning to his home, his hard-earned savings exhausted, finds there is no immediate call for his educational and practical abilities, and himself compelled to return temporarily to manual labour. Such is one phase which experience teaches; it is also equally true an education only commences on leaving school or college, and it is well known the artizan's son by application may become the capitalist.

Nor is anything to be gained by calling hard names. If a young man desires to follow the profession of mining, if he enters one of the technical schools and passes through the various departments successfully, receiving his diploma, the chances are very materially in his favour that he will afterwards succeed, which he deserves. And the question here arises how can an intelligent young practical miner be so trained to be his honest rival in technical learning and general qualifications? To talk of technical education for miners is one thing, but its acquirement is another. A pound a week, or 52*l.* per annum, is rather above the average wage of a practical metalliferous miner. Taking that as a base, and supposing he saves 25 per cent., he will have 13*l.* at a year's end. Estimating now what can be done with his savings, and supposing he should desire to enter the Royal School of Mines—not to become an Associate, but merely to qualify himself during one session, attending (say) four courses of lectures, selecting from the subjoined list which he may mostly desire—chemistry, applied mechanics, physics, metallurgy, mining, mineralogy, geology, mechanical drawing, taking during the course three month's practice in the laboratory in practical assaying. To attend the course of four lectures will cost him 16*l.*; three months in practical assaying 12*l.*, adding 5*l.* to cover incidental laboratory and other expenses, or 33*l.* at the lowest for nine months study. To reside in London during that time at 1*l.* 2s. per week would cost him 42*l.* 18s. more, to which must be added railroad and other petty expenses of (say) 5*l.* The total would be 80*l.* 18s. Now one year's savings for a miner are estimated at 13*l.*, so that it would take him over six years by his own efforts to secure the means to attend one year at the Royal School of Mines. Even then he could claim but little recognition. To become an Associate requires three years study, or if promising sufficient knowledge on passing a specified examination it may be accomplished in two years. It is, therefore, useless to disguise the fact, unless pecuniarily assisted, young miners cannot acquire, however desirable it may be, a recognised qualified technical education. To humour one's self with the reflection it is not worth the money is beside the question. Even a partial knowledge of the above subjects is valuable, and the name appended to each course of lectures is a guarantee that any young man who attends, unless exceedingly dull, or remarkably advanced, will receive his money's worth. No one doubts its pecuniary value. It is rather the want of means than want of desire that such a small proportion of those who receive such technical education are drawn from the ranks of the skilled labouring classes. The passage of the Coal Mines Regulation Act has doubtless acted as an incentive to many of the under officials within its jurisdiction to acquire technical knowledge. An examination to secure a manager's certificate of competency is within their reach, but which requires a study, or rather the knowledge of the nature and properties of gases, ventilation, general principles of engineering, surveying, practical mining, geology, &c., whilst a step in the right direction still leaves much to be desired. Another interesting feature here presents itself. Which course is the most likely to attain the desired end, a technical training as mining apprentice to a mine manager or mining engineer, or a course of study in a technical school?

Leaving that, however, and returning to the subject of education for the working miner, it is plain until something approaching the system in practise in many of the technical schools in the United States is employed, until some wealthy benefactors endow colleges, thereby relieving the student of tuition fees, leaving him simply to support himself, and arranging even then for the latter's comfort by providing board and lodging at the cheapest possible rate, there is but little chance for an efficient college-taught technical education for miners to qualify such as may desire to become a more efficient mine manager.

R. X

THE LEAD TRADE.

Sir,—Our market remains firm, and the feeling that silver-lead is scarce has a tendency to move prices up, although speculators for the fall every now and then sell some lead to force prices down, so that they may cover their wants, and until they do so the market will only remain unsettled. The following sales are reported:—600 tons Greek lead, at 14*l.* 12s. 6d.; 170 tons Spanish silver-lead, at 15*l.* 7s. 6d.; 200 tons Spanish first fusion, at 15*l.* 7s. 6d.; 200 tons Northumberland lead, at 15*l.* 5s.

Stocks.

Newcastle-on-Tyne, Oct. 14.

THE PRINCE OF WALES MINE.

Sir,—Since I wrote to you a fortnight ago a great change has taken place in Prince of Wales Mine. In addition to forking the part of the mine which was formerly worked successfully for copper, the agent has set men to examine the old Good Luck tin lode, which he finds is from 4 to 8 ft. in width, and is a very promising lode for the production of tin. He is going to have the stuff assayed to ascertain its value. A gentleman whose acquaintance I made in the neighbourhood writes:—"Everybody here is very sanguine that the Prince of Wales will make a thorough good tin mine as well as a copper mine." I hope some who read my former letter has paid John Harvey a visit and verified what I said. In a few days I hope to pay another visit to Gunnislake, when I expect the agent will be in a position to give us some important information. As my letter about Gunnislake (Clitters) and Old Gunnislake will be a long one, I must defer it till next week.

Practical Man.

P.S.—I am told, on good authority, that North Busy is likely to become a very valuable property, and is now more than paying expenses. Will any of your readers who have visited the mine tell tell us how matters stand?

MINING IN THE TAVISTOCK DISTRICT.

Sir,—In the report of the proceedings at the starting of the Devon Great United engine on Wednesday, I am supposed to have said—"Then it was considered an impossibility to raise a stone of ore to the east of Truro. My father was the first man who had to do with mining to east of Truro," &c. My remarks really were: This district I look upon very much as West Cornwall was some sixty years ago, then it was considered an impossibility to raise a stone of ore to the south-east of Carn Brea. My father was about the first man who had to do with mining to the south-east of Carn Brea, and opened a mine there named South Dolcoath, and had he gone a few hundreds of fathoms further east he would have cut the rich lodes of South Frances, Basset's, &c. I then passed over Truro and came on to the St. Austell district, &c. Although not known to me, you had at the time I made the above remarks a letter for insertion in last week's Journal from Mr. R. Symons, of Truro, in which I am pleased to see that what I then stated is more than corroborated by him. Mr. Symons in his letter on "Camborne—its Mines, &c.," says—"Mr. Petherick, the manager of Dolcoath, said there was not copper ore enough in the district south of Carn Brea Hill to make a penny, but that since his day about 3,000,000*l.* have been sent to market from Wheal Basset, Wheal Buller," &c.

I have repeatedly heard the late Mr. J. C. Lanyon, of Redruth, say that the first share he ever took in a mine was with my late

father in South Dolcoath. The mine was divided into 71 shares, and amongst the 23 shareholders are the names of E. W. W. Pendarves, E. M Scott, J. Boulderson, J. Mead, J. C. Lanyon, Tobi Lanyon, Arthur Woolf, William Clark, J. Paull, H. Burgess, Eli Morcom, Robert Bennetts, &c., names well known at that time. The costs were closed monthly, and a call made to defray each cost, which call was duly collected before the men were paid, and a note made in the cost-book. I quote one:—"Dec. 1, 1828: Call of 3*l.* per share to pay last month's cost." I notice that for several years no alteration was made in the share list, but a fresh list was entered into the cost-book each month.

I am sorry to trouble you with this, but consider the explanation necessary. MOSES BAWDEN.

Tamar View, Tavistock, Oct 11.

PEDN-AN-DREA MINE.

SIR,—The mine is said to be full of water, which will not be got out except at considerable expense, and then the lodes are reported to be exhausted. Does that refer only to the ground opened, or that the lodes are unbottomed? If the former, might they not open a good mine below, although rather deep? If the latter, of course they cannot get much, for to talk of riches in the shallow levels is absurd. A MINER

GROGWINION MINE—ORE SALES.

SIR,—I have been a shareholder in the above company from its formation, and have participated to the extent of my ability in every issue of shares, and on calling at the office of the company a few months ago it was suggested to me by the secretary that, holding so large an interest, it was surprising to him that I did not go and see the property—adding that the directors would always be glad for shareholders to do so, and would give them every facility for a thorough inspection.

I have taken advantage of this suggestion, and would recommend my brother shareholders to do likewise. I took the train from Aberystwith to Trawscoed station on the Manchester and Milford Railway, and walked through a beautiful country about three miles to the mine. Having made myself known to the captain, by a letter from the secretary, I was received with every courtesy, and having told him that I wished to make a thorough inspection at surface and underground he told me I must be prepared for a hard day's work, and we at once commenced by going over the dressing-floors. I first saw a train of trucks, loaded with ore, being drawn from the deep adit level; the contents were shot down through a large grating, where they were washed and sorted, the larger blocks to go to the spalling-floors, and the smaller direct to the mill. From this mill it was discharged into the jigging machine, which piece of machinery struck me as being a marvel of perfection. It washed the ore clean from dirt; it divided the coarse from the fine particles, and turned the former out fit for market—the fine portions being conveyed to the buddles and slime-pits, there to be further washed, so that it seemed impossible for the smallest particle to be lost, or any impurities to be in. The whole of this ingenious wonderful self-acting machinery is the invention of Mr. Kitto, and is worked by water-power, and every device seems to have been adopted to dispense with manual labour.

The captain next took me about a mile up the river to see the dam, which was erected at great outlay across the Ystwith some years ago, and the water for turning the machinery is brought from that point in a leat, cut sometimes through solid rock, and sometimes built up on the side of the hill to the main wheel, which is 40 ft. in diameter, used for crushing the ore. A new 60-ft. wheel is about to be erected for the purpose of pumping and drawing the stuff from the new shaft below the deep adit. We now walked to the summit of the Grogwinion hill, which rises most abruptly fully 1000 ft. above the level of the river. In performing this feat we were, to use a nautical phrase, frequently obliged to "tack," and in doing so we had an opportunity of seeing some of the ancient workings. There is no doubt that this mine has been worked at different intervals for many centuries to very considerable advantage. The captain showed me places from which it is stated that lumps of nearly pure lead were taken, weighing from 3 cwts. to 8 cwts. each, and those, of course, were close to the surface, as no machinery was employed in those times. It appears that a series of levels were driven in the side of the hill, some of them from the imperfect manner in which they were secured have fallen in, but sufficient indications exist to show that very considerable operations must have been carried on. The deep adit level was driven straight into the side of the hill for nearly half a mile to reach the lode, and subsequently a shaft was sunk from the surface, to what is now known as the shallow adit, where a large quantity of ore was met with of a very pure quality—so much so that it is recorded that it was sold as what is technically called round ore at 3*l.* per ton more than if it had been crushed and dressed. This mine was for many years carried on by Mr. Attwood and partners; bnt it is by the present company, under the able superintendence of Mr. J. Kitto that it has been systemically laid out and brought to its present high state of perfection.

The new shaft which is being sunk from the top of the hill is near the centre of the property, and when completed will be used for workings below the deep adit level. This shaft has been started from several levels simultaneously, so that it will in all probability be completed from top to bottom in about two months, when I have no doubt the first level below the deep adit will have been commenced. We descended the old shaft, examining on our way the 58, 68, and 80 fm. levels on Nos. 3 and 4 lodes. The stopes in these parts of the mine were looking very well, and I have no doubt that the usual sales of 100 tons of lead per month will continue to be made from what we may call the old workings for many years to come. By the old workings I mean the levels I have particularised, and which are all situated above the deep adit.

We now descended the New shaft below the deep adit, into what we may call the new workings, and a finer course of lead ore I never saw; it varied in value from 2 to 4 tons to the fathom of ground, and in some places is even richer. The ore is almost pure, the only admixture being a little carbonate of lime. I also descended a winze which is sunk a few fathoms to the east of this new shaft, and here I saw the same run of beautiful ore. Judging by the astonishing manner in which the lode is opening up in these deep workings, it being far richer than anything seen in the upper levels, I think we may naturally look for a material increase in the sales before many months are past. From my own observations, and also from careful enquiries, I consider the purchase of ground to the north lately made from the Crosswood Mining Lands Company to be a most judicious one—in fact, it adds very materially to the value of the Grogwinion property

The estate of the Crosswood Company is bounded on the south by the Grogwinion, and on the north by Frongoch, and contains a very large acreage of highly mineralised ground, and already a rich discovery of lead has been made at a place called Pantcherion, adjoining Grogwinion. It is almost entirely surrounded by rich mines, and the old workings reveal some good stopes, which have evidently been very profitable, and which show that on sinking to a lower depth good results will be obtained. One thing has struck me rather forcibly in going through this district, and that is the, as I think, unsatisfactory way in which the produce is sold. I am informed that a mint once existed at Aberystwith. If this is true it must have been for the purpose of coining the native silver, and smelting must, therefore, have been carried on somewhere in the locality. In Yorkshire and the North of England many mines producing 40 or 50 tons of lead per month I believe smelt their own ores, and yet in the midst of a whole group of mines whose produces ranges from (say) 30 to 200 tons of lead per month there is not a single smelting-house, but the ores are divided between some half-dozen smelters, who, so far as I can see, appear to have things all their own way, and who must make a very nice thing out of the business. Why, I ask, should this state of things continue? Why should not the ore from all these mines be smelted at Aberystwith, or somewhere near? Coals could be brought here cheaply enough by water from Swansea or Briton Ferry, and the pigs could be sent away either by water or rail to all parts of the kingdom. Surely in these days of co-operation something better might be done, and a lot of money saved for us shareholders. I should think there are many shareholders in the Grogwinion and other mines who, like myself, only require the matter to be put before them in a business-like form to carry into effect some such alteration as I propose. I feel persuaded that if something of this sort was adopted a saving would be effected equivalent to a handsome dividend on the capital. I should like to see this subject discussed by other correspondents in the columns of your valuable Journal. AN ORIGINAL SHAREHOLDER.

Oswestry, Oct. 6.

MYNYDD GORDDU LEAD MINING COMPANY.

SIR,—A report having been spread that this company is winding up, pray allow me to say that this is not the case. On the contrary, we are in quite a flourishing condition; have during the last eleven months (although almost entirely stopped for four or five months for want of water) sold 2556*l.* 2s. 4d. worth of lead and blende, and hope by the expiration of the twelve months ending the 30th inst. to increase that by nearly 400*l.*, whilst our London expenses (which are very light), and our pay-sheets for the eleven months (including merchants bills and every other cost except the royalty of 1-14th, and some land and water rents) are only 2306*l.* 17s. 10d., and what is of far more importance, the mine is developing splendidly in depth. We have also recently completed, in connection with the Court Grange Company, the extensive reservoir, the construction of which has been proceeding (as the season permitted) over the last two years; a magnificent piece of work, of which we and our coadjutors are justly proud. The completion of this reservoir, which will form a lake of about three-quarters of a mile long, and from one quarter to half a mile broad (and in which we have secured our shareholders some fishing rights) will effectually put an end to the great drawback we have hitherto laboured under in the very intermittent character of our water supply. The reservoir (which is now nearly full, and is estimated to contain about 50 million gallons of water) will provide four months' supply for both mines, and we may, therefore, confidently hope that we shall never again have our operations stopped (as we so frequently have hitherto) by drought.

The report referred to in the commencement of this letter has, no doubt, originated from the recent insertion in the Gazette of a statutory notice for claims to be sent in by any creditors or shareholders in the old Monydd Gorddu Lead Mine Company (Limited), which was voluntarily wound up some months ago, when this company (forming virtually the same proprietary) took the mine over under a reconstruction, but as the report has already caused some annoyance I hope you will kindly insert this letter, explaining the real position of affairs.—*Finsbury Circus, Oct.* 11. A. W. SNELLING, Sec.

EAST CARADON MINE.

SIR,—The next meeting of adventurers will be held on Oct. 22, when it is probable that a call of from 4s. to 5s. per share will be made. This, it is to be feared, will prejudicially affect the value of the shares by shaking the confidence of some shareholders who have been looking for something more encouraging than "hope deferred." It should not, however, be forgotten that the present condition of the mine is vastly superior to that at the commencement of the year. More rapid progress is now being made in the workings, which are energetically pushed forward, and, as may be seen by reference to the fortnightly reports, there are striking indications that a great change for the better in the character of the lodes cannot be far distant. If the rate of progress made during the present year is maintained East Caradon should soon become a dividend mine, and with such a prospect a call of even 4s. or 5s. per share can be regarded with composure and comparative cheerfulness.

Oct. 13. A SHAREHOLDER.

[For remainder of Original Correspondence see this day's Journal.]

THE NEW COLORADO MINES ON THE EAGLE RIVER.

IMPORTANT DEVELOPMENTS—ENGINEER'S REPORT.

Judging from the great number of mining companies which have been recently organised under the laws of the State of New York for the purpose of working Colorado silver mines, it is apparent that Eastern capitalists are entertaining a high degree of confidence in the future production of that class of properties, on account of their being situated in the neighbourhood of the world-famed mines of the flourishing young city of Leadville.

An interesting report upon the character and the merits of a group of 32 new mines now being worked by the Consolidated Eagle River Mining Company has just been made by Mr. W. A. Shepard, an engineer well acquainted with the mining industry of Colorado. The examination of the above mines was entrusted some time ago by a number of European capitalists to Col. J. Berton, whose name is familiar to our readers as having been on frequent occasion commended by the English Press for the impartiality and truthfulness of his reports. But on account of being detained by illness in New York he requested Mr. Shepard to act in his place; the selection of the latter mining expert was determined by the highest testimonial presented in favour of his ability and integrity, and fully confirmed by the Consul-General of France in New York.

The Eagle River Consolidated Mining Company is managed by a board of trustees, among whom we notice the names of gentlemen of an unexceptional standing. The President, the Hon. Calvin T. Hulburd, ex-member of Congress, is a scientific man of great merit; he was a few years ago, on account of his qualifications and his well-known integrity, appointed by the United States Government to superintend the erection of the New York Post Office building. Mr. Hulburd has taken up his headquarters at the mines, where all workings are made under his personal supervision. The Vice-President of the company, Gen. Edwin A. Merritt, occupies at the present time the high and responsible position of collector of Customs in the City of New York. Among the other trustees we notice the Hon. Adelbert Ames, ex. United States Senator and Governor of the State of Mississippi, and several well known and wealthy American merchants and capitalists. With a company so strongly organised it would be difficnlt to suppose that its managing officers, being all gentlemen who occupied the highest positions, would lend their names to a doubtful undertaking, and thus risk their good reputation. The composition of the board of trustees of the Eagle Mining Company can, therefore, be considered as a favourable indication of the soundness of the enterprise.

We extract the following from Mr. Shepard's report:—

GEOLOGICAL CHARACTER OF THE COUNTRY.—As I approached the Red Cliff mining camp on Eagle River, at and around which this company's properties are situated, I examined the geological features of the rocks, and found the strata with few exceptions lying with great regularity in the series known to that region. The strike of the mineral bearing rocks through the country is west of north and east of south. The sandstone, porphyry, limestone, and quartzite form the regular succession of the formations above the granite. These strata dip to the north and east at angles varying from 12° to 23°. I was enabled to observe these geological features with facility in the deep gorges of the mountains, where the erosive action of the glacial period had cut the formation in almost vertical planes from the sandstone nearly through the quartzite. I found on my arrival at the mine the management and development of it were under the direction and supervision of the president of the company, Hon. Calvin T. Hulburd, who seems to have proceeded with diligence and discretion. Mr. Hulburd kindly furnished me with all facilities for examining the properties and acquiring all the statistical data which I needed.

POSITION AND CHARACTER OF MINERAL BEDS.—The mineral deposit wherever found in that locality are mostly at the contract of the porphyry or trachyte and the limestone, and similar to such of the mines at Leadville as are included between these strata. Developments at the Belden, the Clinton, and two or three other mines on Battle Mountain, which were the first located and opened in that camp, have proved the character and value of these deposits. Of these mines the Belden is the most extensively opened and proved, and showed at the time of my examination a bed of excellent smelting ore, consisting of soft and hard carbonates, which have steadily increased in richness from the commencent of the tunnel, where the average was about 30 ozs. of silver and 50 per cent. of lead, to 50 ozs. of silver and 60 per cent. of lead at about 150 feet from the opening. The bed of ore increases in thickness, ranging from 6 to 8 ft., and in some places much thicker. Two short drifts have been driven from the main tunnel at right angles, and then turning again at right angles driven parallel to the main tunnel, opening up a bed of ore at very small expense, which is estimated at the value of $50,000. The Clinton Mine, which is situated on the same contact a few hundred feet distant from the Belden, shows an excellent bed of mineral carrying similar ore, but containing also a stratum of gray carbonate of a much higher grade.

DESCRIPTION OF THE COMPANY'S PROPERTIES.—Beyond these mines on the same contact is the Little Ollie, which has shown rich mineral although slightly developed; and adjoining this is the Hope Mine, recently purchased by the Eagle River Consolidated Company. This mine is not shown on the map. Work has been commenced by the company on the Hope, and at the shallow depth of about 12 ft. a fine looking bed of ore has been cut, 8 ft. in width, carrying galena mixed with the brown oxide of iron and some carbonate. The character of this ore resembles that of some of the most extensive mines at Leadville, and it is regarded by experienced miners who have seen it as one of the most valvable discoveries at Eagle River. It will be opened by a tunnel at a point about 150 ft. down the hill from the shaft, and can be inexpensively worked, requiring neither hoisting apparatus nor pumps. This discovery if found at Leadville would be rated at a very high value. The situation of the property on Battle Mountain is such that the ore can be delivered with very small expense at the point in the valley of the river where the smelter is to be erected to smelt the ore of this company.

On the north-west slope of Battle Mountain, as shown on the map, there are also situated ten properties belonging to this company—the French Lode, Henry Ward, Elizabeth, Mutual Friend, Thurber, Sunshine, Big West, Crystal, and Van Vauder Workmeer. The work required by the Government to secure the titles of all these properties has been done, and they are being proved by a shaft now only 60 ft. deep located on the Elizabeth. The work at this shaft is excellent, and a fine shaft house has been erected, with a view to permanent operations at this point. These properties form a very favourable group for development, and as soon as the shaft now being sunk shall have reached and determined the character of the contact they will be opened by a tunnel from the face of the hill to the bottom of the shaft, from which drifts can be driven through the whole extent of these properties. In advance of development it is impossible to state the value of the deposits at the contact at this point, but from all the indications now presented there is no reason to doubt this group will form a valuable part of the company's possessions.

On the south-west slope, and near the main road leading west from Red Cliff, lie the Bunker Hill, John Bull, Quartzite No. 1, and Brother Jonathan. On the Brother Jonathan the work required by the Government is done, and on the Bunker Hill, John Bull, and Quartzite No. 1 the work is now in progress. The John Bull and Quartzite No. 1 are very favourably situated, and will be easily opened; but on the Bunker Hill and Brother Jonathan some preliminary explorations will be necessary before it can be determined at what point to commence work. This is especially so with the Bunker Hill, where the formations are somewhat disturbed, although there are indications which are very favourable for the existence of mineral. On the John Bull and Quartzite No. 1 I should recommend developments to be commenced near the road by tunnels driven at or near the limestone contact, for these would develope at small cost the character and value of the mineral contained in the contact matter. The contact at this point is in the quartzite, and the openings made on the same contact show in some places 4 ft. of contact matter, and at other places from 8 ft. to 10 ft. Near this point on the same contact are the Eclipse, from which I was informed ore was taken away assaying 104 ozs. of silver to the ton; the Combined Discovery, from which assays gave as high as 226 ozs.; the Silver Age, 134 ozs.; the Polar, 102 ozs.; and the Hidden Treasure, 86 ozs. The four properties of the company are favourably situated for mining, and from tests of the mineral taken from the Eclipse, Combined Discovery, and other mines as given above may be reasonably expected to prove valuable.

The properties owned by this company on Horn Silver Mountain are as follows: The Manitou, the Montcalm, the Lafayette, Great Northern Texas Bell, American Girl, Homestake No. 1, Neptune, Melvina, Renova, and St. Louis. On several of these claims a considerable amount of development work has been done, and so far as it has proceeded the results are promising. The formation at this point is regular, and the working of the mines will be easy and inexpensive. The Manitou lies lengthwise along the quartzite contact. A tunnel has been driven in over 100 ft. from this property, and the appearance of the contact matter indicates the presence of mineral, though not yet in large quantities. There is good reason to believe that an extension of this tunnel will reach a bed of compact mineral. The Moncalm, Lafayette, Great Northern, Texas Bell, American Girl, and Maud (which is a new mine recently secured) lie in a compact bed across the contact of the porphyry and the limestone, and can be inexpensively worked by one operation. The Texas Bell and Montcalm are being opened by tunnels, and the Lafayette by a shaft. I should recommend the abandonment of two of these works, and the driving of one main tunnel upon the Lafayette, to which I would afterwards sink the shaft as an air shaft. When the bed of mineral shall have been proved by such a tunnel, which would run east and west, then north and south drifts could be driven, opening up all of this group. On Homestake No. 1 a shaft is now down 55 ft., but as yet not quite through the porphyry. On the Melvina and Neptune nothing more has been done than the work required by the Government. On the Renova they are now doing the Government work. On the St. Louis a tunnel has been driven 30 ft., but there are no decided evidences upon which to estimate its value. There is, however, no reason to doubt from developments in the immediate vicinity that this group of mines will prove to be valuable, and should the bed of mineral at that point prove to be rich this group of properties would alone constitute a fair basis for the capital stock of the company.

The Van Rolt is another recent acquisition of the company, and is situated to the south-east of the village of Red Cliff. It adjoins the Herald Mine, which has recently struck very rich mineral in its tunnel at less than 150 ft., and is on the same contact, and there can be no doubt that the tunnel, now already 100 ft. in the Van Rolt, and parellel to that of the Herald, will strike the same bed of ore at the same depth. The president and superintendent of the company as well as the miners expressed most favourable opinions as to the value of this mine. The tunnel of the Van Rolt is an excellent piece of work, and is a good beginning of a permanent operation, and if the Herald proves to be as valuable as they claim it to be the Van Rolt cannot fail to yield very large returns to the company.

The next and last group of properties which I have to mention are the company's claims at Gore Creek. These are the Lalla Rookh, the Alpha, Omega, and Princess; they are full claims, lying in a compact body on the north-east side of Eagle River and north of Gore Creek. Their position is very favourable for mining operations, as the canyon of Eagle River and the deep gorge of Gore Creek cut down the mountain on two sides of them. They lie across the contacts as shown by the map, and can be opened by tunnels directly on the contacts, which are exposed on the mountain sides. This group adjoins the Hopewell and Calkins properties on the north-east, and developments at that point show the largest contact deposit yet found at Eagle River. At some places this contact is over 20 ft. in width, and properties located in that immediate vicinity which have been opened on the contact are considered very valuable by experienced miners. I would recommence active developments of these mines, for a bed of mineral in that contact would be cheaply mined, and would undoubtedly occur in large deposits if we can judge by similar deposits in the wide contacts at Leadville. Assays of mineral taken at points near these four properties from same contact have given from 40 to 90 ozs. of silver and as high as 3 ozs. of gold per ton. The proportion of lead near the outcrop was, however, only 28 per cent.

LOCATION OF MILL SITE.—The above-described properties constitute all the possessions of the Eagle River Consolidated Company except the St. Louis Mill site, which is situated at the foot of Horn Silver Mountain. As to the value of this mill site I will say that it will be needed as soon as the mines on Horn Silver Mountain are opened sufficiently to deliver ore in large quantities. At the start I would recommend the company to erect their smelter at the foot of Battle Mountain, where they are sure to receive all the ore they can smelt.

ECONOMIC ADVANTAGES.—The economic advantages presented by the mining properties owned by the Eagle River Consolidated Company are undoubtedly very great. To some of them I beg to draw your attention:—1. The exposure of the contacts on the face of the mountain saves heavy expenses of exploration for the contact, such as they have been subject to at Leadville in nearly all of the operations at that point.—2. The mines can be opened by tunnels in nearly all of the properties, thus saving the large outlay for working shafts, hoisting apparatus, and pumping machinery, which in some operations would alone amount to from $100,000 to $150,000 before productive mining could be commenced.—3. The properties are so situated that that the ore can be at many points sent by shoots down the mountains to the bottom of the canyon, where the railroad will furnish transportation at not exceeding 50c. per ton to the smelter; thereby saving an expense which at many mines now operated on a large scale will amount to fully $5 per ton. On 200 tons per day—say, 60,000 tons per annum—this would be $300,000.—4. The ore of the Eagle River Mines is so easily fluxed that it can be smelted at one-half the cost of smelting many of the ores from some of the Leadville mines. So great will this saving be that on a product of 200 tons per day only it would pay a fair dividend on the par value of the Eagle River Consolidated Company's stock of $10,000,000.—5. The uniform regularity of the mineral-bearing rocks at this point in the Eagle River canyon alike as to stratification and position is such that in nearly every property the best plan of operating can be easily determined at the start both as to development and economy.—6. That regularity of formation will render the discovery of mineral on any adjoining property in advance of your developments an almost certain indication of the value of your own.

In conclusion, permit me to say that it must be borne in mind that as a rule the two great elements of expenditure in mining are:—1. The plant of machinery.—2. The labour employed to open the mines, produce the ore, and reduce it to the precious metals. Every intelligent miner knows that the dividends in all mining enterprises where the ore is not exceedingly rich must depend on the economic management of every branch of the business. Now in the Eagle River mining properties the conditions for accomplishing all the ends of economic mining are more favourable than I have ever seen at any other point during 25 years experience in that business.

In a word the remarkable facilities afforded by the position and character of this companies mining properties are—1. In the inexpensive methods of opening the mines.—2. In the small cost of mining the ores.—3. In the cheapness of delivering the ores at the smelter.—4. In the fine smelting quality of the ores in carrying their own flux.—5. In the safety of the working plans for productive mining. All these advantages, concludes Mr. Shepard, combined present an opportunity rarely offered for safe investment in one of the largest mining enterprises in this country.

STEAM ON TRAMWAYS.—General Hutchinson, one of the Inspectors of the Board of Trade, on Tuesday proceeded over the Chapeltown section of the Leeds tramways to inspect the line with a view to the use of steam in drawing the cars. It will be remembered that there was recently a three months' trial of a steam car, made by Messrs. Kitson, on the Wortley line, with such satisfactory results that the tramways company applied to and received permission from the Town Council to run steam cars on their lines for the next twelve months. The Inspector, accompanied by the Chairman of the company (Mr. W. Turton), Mr. Eddison and Mr. Baxter (directors), Mr. Wharam (the secretary), and others, left Boar-lane about nine o'clock in the morning in a car drawn by Messrs. Kitson's engine, and proceeded to Chapeltown. The run appeared to be highly satisfactory, the heavy gradients on the line presenting no difficulty to the engine, which appeared to be thoroughly under the driver's control, and was easily stopped even in descending the hills.

APPLICATION OF SLAG WOOL.—For protecting pipes accessible to round Mr. D. H. DADE, of Bermondsey, used a cover made of tin or zinc or wire gauze, which goes all round the pipe, leaving the required space for the silicate cotton to be filled in, and similarly

flanged and pierced along each edge, and also formed with an overlap; at one end these covers are supported at regular intervals on bands or rings made of the so-called patent woven silicate cotton, lapped round to the required thickness. To apply these covers he opens them up, fills in the slag wool level with the bands or rings aforesaid, and then brings the flanges together, fastens them together by wires passed through the holes, and turns down the flanges. To prevent rusting he prefers to paint these wire gauze covers with silicate paint. This part of his invention is specially applicable for preventing the freezing of water in pipes and for preventing the condensation of steam in pipes. In order to make silicate cotton adhesive he mixes it with plaster of Paris or other cement, and it can then be applied as a paste when mixed with water, which may be combined with liquid glue or other material for binding it and for counteracting the hygroscopic property of the silicate cotton; or after application he may give it a coating of silicate or other paint.

REPORT PROM CORNWALL.

Oct. 14.—We have had fresh illustrations of the value of the official standards in the way our smelters now are content to follow instead of to lead the variations and vagaries of the tin market. Not that they are, however, so much to blame for this as that the conditions have changed, and that London now occupies the place that Cornwall, in this matter, formerly held. The misfortune is that although this has been apparent long enough it is not yet so plainly recognised as it ought to be and would be if the interests of mining generally were consulted. Our opinion strengthens almost daily that the day of local middlemen is passing away, and that in this matter, at all events, we want more direct communication between the producers and the London market. This of course would entail sundry changes of detail, but few that are really difficult, and none that are insuperable. Meanwhile those who may be accredited with being best informed retain their unabated confidence in the future; and for ourselves we believe 1880 will close under brighter auspices than any year for the last decade.

The question of the existence of lodes in Australia has again cropped up, and as it seems to us with a great deal of what used to be called "vague declamation." Now everybody who knows anything at all about the matter knows that the stream tin deposits are of a secondary character, that they are the result of the destruction and re-deposition of smelting in the nature of tin lodes, and not in their present form natural deposits. Nor is it at all likely that all the Australian tin lodes disappeared in the formation of the alluvial stanniferous strata. But what then? There are lodes and lodes, and it is none the less true that no tin lode has yet been found in that country. The miscalled quartz "reefs," which produce gold, have been quoted in support of the view that tin lodes may yet be found, but lodes like these, which, take them all round, do not pay a remakable profit for gold, would never pay to work for tin, and it is quite on the cards that it was in some such thinly disseminated lode stuff as this—a poor "stockwork" probably—that the present stream tin deposits had their origin. If so, Cornwall has litle to fear from their discovery. But even if a few really good fissure lodes were found—what then? Our point has always been, and we see no reason to change our opinion, that lode mining against lode mining Cornwall can beat Australia any day; and that it is the special cheapness of working alluvial deposits against mining proper that has so far given Australia an advantage. We may depend upon it that whenever Australia has to mine for her tin, instead of wash it—if ever that day does come—we shall find that Cornwall can raise the cheapest. The question is, not merely whether tin lodes exist in Australia or not, but whether they, under the costly labour and material conditions of the Antipodes can be worked to compete with us? Experience so far points to only one answer.

There is a good deal that is encouraging just now in the general aspect of mining affairs down West. During the past few days quite an unusual number of improvements and discoveries have been reported, and that from almost every part of the district. It is remarkable how frequently news of this kind crops up simultaneously in many comparatively distinct localities. Another capital evidence of the vitality at present shown in mining enterprise is the starting of such concerns as the Devon Great United. We have always had faith in the future of West Maria and Fortescue, and now that the difficulties which impeded its development are removed there is hardly a concern in the West of which one might not prophecy more safely a successful career. It is in capital hands. There is much encouragement, too, in such facts on the reward of perseverance in Wheal Grenville. Altogether, therefore, there is every reason despite speculative market fluctuations to be satisfied with our present outlook.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Oct. 14.—There was a large attendance at the Ironmasters' Quarterly Meetings, both in Birmingham to-day and in Wolverhampton yesterday, and business in best finished iron was transacted upon the basis of the 10s. drop declared a week ago. Marked bars were 7*l.* 10s., with the usual 12s. 6d. extra for the Earl of Dudley's make. A few sales, however, from merchants of Earl Dudley's iron were recorded at prices below this figure. Messrs. Phillip Williams and Son, and Messrs. Millington, who in July brought their bars down to 7*l.* 10s., kept them at that figure. The makers of medium and common qualities were offering their iron at a drop of from 2s. 6d. to 5s. per ton where a good order was likely to be the result. Pig-iron makers were well represented upon 'Change, and it was made known that the Lilleshall Company were 5s. down in their quotations. Some hematite pigs, which during much of the quarter have been firmly held at 80s., were easy at 70s.—a figure at which they had but little chance against all-mine iron at from 5s. to 7s. 6d. less. The selling prices of the Lilleshall Company were—hot blast 3*l.* 5s., and cold blast 4*l.* 5s. Spring Vale iron was—common, 2*l.*; all-mine, 2*l.* 10s.; and hydrates, 3*l.* Northampton pigs were quoted 2*l.* 3s. 9d. easy. The number of furnaces in blast in South Staffordshire is 35. The Coal Trade was yesterday only quiet, and supplies could be bought with freedom at 6s. 6d. per ton and upwards at the pit's mouth.

There were several objects of interest exhibited in the hall. Among them may be mentioned Mr. Sherwin's patent disc pulleys in steel or wrought-iron, designed to obviate the danger attending the use of ordinary open pulleys, which sometimes catch the clothes of workpeople and carry them round. Instead of arms the body of this pulley consists of a disc turned true at the periphery, making it practically as true on the face as a turned cast-iron one. The periphery bears on the disc the whole way round, and is held to it by means of thin ribs, riveted. The absence of arms not only obviates the special danger we have alluded to, but economises power by diminishing the resistance offered to the air, and prevents undue wear and tear, owing to the perfect balance of parts and the equable distribution of the pressure. Messrs. Penzer, Randle, and Co. exhibited a model and drawing of their registered calculating rule and square, which offers great facilities for calculating every description of iron, especially as regards the weight and sizes of bars, &c. Samples of composition waterproof covering for boilers, steam-pipes, &c., were shown by Messrs. T. Smith and Co., of Burton. Messrs. Spencer exhibited specimens of iron tubes, fittings, and hollow ware, protected by Prof. Barff's anti-corodo process for preventing rust. Fire-brick linings and floorings for blast furnaces were shown by Messrs. Harris and Pearson, Stourbridge, and typographic printing by Mr. T. Bolton.

It is matter for satisfaction that the Hamstead Colliery Company have now disposed of 70,000*l.* worth of the preference shares which of late they determined to issue, and I am told that the directors are not anxious to dispose of any more. The vacant seat on the directorate has been filled in the person of the Mayor of Birmingham, Mr. Richard Chamberlain.

The Sedgeley magistrates on Monday fined Isaiah Foley, manager of the Hange Colliery, Tividale, Oldbury, 20*l.* and costs, for violating the first general rule of the Coal Mines Regulation Act, which requires that an adequate amount of ventilation shall be constantly produced in every mine. The Assistant Government Mines Inspector stated that there was no ventilation in any part of the mine, and in consequence an explosion had occurred. At the same Court William Pearson, of the Pearson's Old Hill Colliery, was summoned for infringing the 17th section of the Act, which enacts that where the amount of wages paid to any of the persons employed in a mine depends on the amount of mineral gotten by them, such persons shall be paid according to the weight of the mineral gotten. It was stated that the workmen were paid 6d. per small tub and 9¾d. per large tub of coal, and that they refused to work any other way. The Assistant Mines Inspector deposed to remonstrating with Pearson some time ago, who promised to comply with the Act; but on July 17 he found the same improper system existing. Defendant was fined 10s. and costs, on the understanding that the Act was immediately complied with.

In Birmingham to-day (Thursday) there was an overflowing attendance and plenty of inquiry, but only a small aggregate of actual business. There was a tendency to ease in the sale price of both raw and rolled iron, but the ease was insufficient to satisfy consumers. Sheets were to be had for galvanising and for working up at, in a few cases, 5s. to 10s. under the Association prices; but galvanisers held off.

TRADE OF THE TYNE AND WEAR.

Oct. 13.—The demand for coal improves generally; the steam coal trade has been retarded a little lately on account of a scarcity of tonnage, but the weather has now moderated, and a better supply of ships may be expected. The demand for house coal has improved considerably, and the recent advance of 6d. per ton on this coal is fully maintained. The gas coalt rade is steady, and full employment for the best gas coal works is expected during the winter. The coke trade is good, with a steady demand for home and inland consumption. A dispute has occurred between the masters and the miners at the coking collieries of Messrs. Straker and Love, near Auckland, and the men threaten to strike; but as the case has been in the hands of the joint committee, and decided by that body in favour of the men to a certain extent, we think it probable that minor details will also be settled shortly, and that a strike will be avoided. A strike has occurred at three of the large collieries of the Earl of Durham, on the Wear, caused by a difference between the Union and non-Union men; the Union men refused to go down the shaft with the non-Union men, and this foolish proceeding caused, to some extent, a stoppage of work, which the masters would not submit to; the men were ordered either to fill the cages with the usual number or not go down at all, and when they refused to fill the cages they were stopped, and thus the strike or lock-out, whatever it may be, has occurred. This stoppage appears to be a foolish affair; there is no dispute as to prices, and there is really no valid reason for the stoppage.

The sinking operations at Whitburn new winning continue to be pushed forward; the first shaft has now been sunk through the shale coal measures a considerable distance, and a small seam of coal has been passed through, which will probably be worked for the engines on the works. The second shaft is being sunk through the water-bearing strata by the Chaudron boring system, and this part of the work is approaching completion. The members of the Northern Institute of Mining and Mechanical Engineers have been invited to inspect these extensive and important works, and it has been arranged that the visit shall be made on Friday, when it is expected that a considerable number of the members will avail themselves of the opportunity to attend. Those shafts are the first that have been sunk by the Chaudron system in the North of England, and, of course, the works will be viewed with much interest by the members of the Northern Institute.

We have noticed lately that the strong dissatisfaction felt with the arrangements of the North Eastern Railway Company, both as to facilities for traffic and rates charged, was likely to result in some action being taken to provide some remedy. What is wanted is more direct communication between the district and Liverpool, and there appears now to be some probability that the Midland Railway Company will get access by some means, most probably by the construction of a new line. Surveyors have been engaged lately in South Durham and near Auckland by that enterprising company.

The iron trade has again suffered a relapse, and prices of pig-iron have fallen a little; in fact, the fluctuations in the pig-iron markets in Middlesborough and at Glasgow lately have been brought about by speculators—Bulls and Bears and makers have little to do with those movements. Makers have continued to sell a considerable quantity of iron, and they have varied their rates but little; No. 3 is quoted at 38s. 6d. The stock of pig-iron is nearly 284,000 tons—about the same as the quantity in hand at the beginning of this year, since which time shipments have averaged about 80,000 tons per month. The bad weather has retarded the shipments of iron; the present prices increase sales inland and for shipment to America. The finished iron trade has improved a little; there has been a great demand for ship-plates both for local use and for Scotland. Some firms have orders for plates which will keep them going six months; plates are 6*l.* 10s. Angles are also in great request. The new steel-works at Eston—lately erected by Messrs. Bolckow and Vaughan—continue to attract much attention, as they are the only works in this country where the Thomas-Gilchrist process has been tried. There are three blast-furnaces, and when the molten metal is tapped it is not run into beds, but passes along a channel into a vessel, by which it is conveyed into the "convertors," and after about twenty minutes "blow" the steel is ready to be rolled into rails or other articles of commerce. There are two large convertors of peculiar construction for the purpose of making steel from Cleveland iron; they are much shorter and wider than hematite convertors, and they are worked by hydraulic machinery. The metal is run into ingots of 33 cwts. each. There are 20 large boilers, all heated by gas from the furnaces. Three large engines have been put down lately; but we have already noticed these engines. The basic brick convertors have worked satisfactorily so far, and in a short time it is expected that the experimental stage will be passed. The process is successful, but a few details are necessary to compete with the Bessemer process. It is expected that when the Cleveland steel is got on to a commercial footing they will turn their attention to the manufacture of steel plates for ships, for which purpose their product is admirably adapted, and it will, it is expected, compete on level terms with the iron plates that are now used for this purpose. The iron shipbuilding trade continues very brisk on these rivers, and most of the engineers and founders are also fairly employed; there is, however, still as a rule a dearth of orders for colliery engines, locomotives, &c.

The College of Physical Science tenth session was opened at Newcastle on Monday by an address from Mr. A. T. Herschell, Professor of Physics. The warden, Dr. Lake, occupied the chair, and amongst those present were Lord Ravensworth, Sir George Elliot, the Mayor of Newcastle, the Professors of the College, Mr. Lindsay Wood, Mr. Geo. May, Mr. J. A. G. Ross, Dr. Bruce, Mr. R. S. Watson, and others. The Chairman, in his address, observed that the college had so far been very prosperous, the number of students had increased very much, and consequently the fees increased. He remarked that a Professor of mining had been appointed, the only professor of that kind out of London, and remarked that he could not turn his attention to a better subject than the devising of a new light, which would render more safe the working of coal mines. Lord Ravensworth alluded to the Seaham explosion, and the demand that had sprung up for fresh legislation in connection with the working of coal mines, and he expressed the opinion that "it was rather the careful and intelligent execution of the existing law which is required than fresh legislation; and he was convinced also that technical education must go further and deeper before there can be any security from the recurrence of those disasters. Sir George Elliot also alluded to the Seaham explosion. He entirely agreed with the remarks made by Lord Ravensworth on legislation. He did not mean to say that legislation had reached its limit; but he ventured to say that in carrying out what he deemed the most essential of all things—discipline—no further legislation was required. He also remarked that he was a member of the Royal Commission on Mines, and that they had got no specific against accidents in mines any more than hitherto, and we would rather have to depend more upon enforcing what he called close and strict discipline. At this moment, so far as his knowledge went, he would have more confidence and more reliance upon discipline than legislation, and without the most careful and strict discipline you could not have immunity from accidents.

There is nothing new to report respecting the Seaham Colliery explosion. The Maudlin seam in which the bodies not recovered lie has been sealed up, and some time must elapse before it can be again reopened; the other seams will now be put into working order, and the works will be again commenced in a short time. It is worthy of notice thas an accident occurred at this colliery 27 years ago; at that time the two shafts here were bratticed, divided into two shafts, and really constituted two distinct collieries, one of them belonging to the Marquis of Londonderry, and managed by Sir Geo. Elliot, and the other belonging to the Hetton Coal Company, and under the management of Mr. Nicholas Wood. It was at the latter colliery that an explosion occurred, and this occurrence led to the formation of the Northern Institute of Mining Engineers, which has since that time attained such great proportions and valuable results. It is evident from this that the Seaham Collieries have always been of a fiery nature.

At Middlesborough, on Tuesday, the quarterly meeting of the Iron and Coal Trades of the North of England was held in the Exchange. There was a good attendance from this district, and also from the West Coast and South and West Yorkshire, &c. The market as a whole was encouraging, prices improved, and there were many inquiries. Several stalls of exhibits appeared, chiefly from local firms. The Electro-Nickel Silver Plate Company, Stockton-on-Tees, made a good display, Mr. H. B. Dunn, of the Middlesborough Forge Company, showed steel spades, shovels, &c. Messrs. Harrison and Wilson, engineers, had Wilson's patent gas producer for firing every description of furnace. Mr. McNay had a collection of articles in connection with engineering, including buffer rings, water ejector, &c., also one of the automatic self-sustaining patent pulley blocks.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Oct. 14.—The drivings east at Preegwyn Colliery, which have been prosecuted at intervals for several years through a band of broken ground in that direction, have at length been rewarded by the discovery of the 5-ft. coal in good condition. This is not only a valuable accession to the resources of the colliery, but it augurs well for collieries that may be projected further to the eastward.

In the Shropshire lead mining district it is said that all the shares in the Amalgamated Mines, Pennerley, &c., were applied for, and that many applications were refused. An important discovery of ore is reported in the deepest workings of the Snailbeach Mine. A movement is in progress for developing the Perkin's Beach Mine in depth, so as to effectually win the shoots of ore running downwards and westwards. This mine, which at various times has yielded large quantities of ore, has never yet been proved more than 20 fms. below the adit, except at several points where runs of ore were followed downwards as far as the power of the machinery would allow. It is one of the largest, if not the largest, mining property in Shropshire, and it deserves a vigorous and systematic development; to which I wish success. By-the-way, here is a question for antiquaries—Which is the correct way of spelling the names of some of these Shropshire mines—Beach or Beech? Is it not the latter?

In Cardiganshire one of the most notable things is the quantity of lead ore at the new mine, Bryn Dyfi. There is an average thickness of 7 in. of solid ore all along the bottom of the new shaft, the ore extending continuously up to surface 10 fms., and the ore opeuing out into bunches 1 ft. thick of solid ore. Operations are being pushed on vigorously at this mine, which is a private one, and one that promises to be a great success. An effort is being made to re-open the Penpompren Lead Mine, Talybont, on a more extensive scale; and there is a group of mines being developed, with promises of success, by Mr. Charles Williams, of Talicsin. The mineral wealth of North Cardigan is evidently not exhausted.

The receipts of the Welsh National Eisteddfod were 2241*l.* 18s. 10d., out of which there is a profit of only 40*l.* 10s. 11d. Still this is better than a loss. This amount is to be divided between four public institutions. Would it not be better to apply the balance, whatever it is, first of all to the publication of any work of merit pooduced by the competitors at the Eisteddfod—if there are any? This leads me to the enquiry, is the essay on the "Metalliferous Deposts of Denbighshire and Flintshire" to be published, and if so, when?

Mr. Shone, of Wrexham, the inventor of a pneumatic sewerage system, has had his plan adopted by the authorities of Eastbourne. This will give the system what it has not had before—a trial on an adequate scale. Mr. Shone has been appointed the engineer to carry out the works, and I wish him success. We will resume our mining journey to Barmouth on another occasion.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

Oct. 14.—In the lead mining districts work has gone on rather more satisfactorily of late, and the output of lead has been maintained at the average; but there are no new ventures to report, for Derbyshire does not appear to be favourite ground in the eyes of capitalists, so far as lead is concerned. The demand for pig-iron is not so brisk as it has been, still there has been no decline in the production of the furnaces, whilst prices have been rather easier. There appears to be a gradually diminishing quantity of ironstone being raised in the county, for the ironmasters are depending more and more upon Northamptonshire for what they require, there being a moderate rate by the Midland. In manufactured iron just now there is but a moderate business being done, especially in bars, as the requirements for Sheffield and other places have slightly declined. On the other hand steel rails are in as brisk request as ever, and the output at Dronfield is large. In house coal there has been a decided improvement, especially as regards London, to which there was sent last month from Clay Cross alone 18,000 tons, whilst an increased tonnage was also sent from several other collieries. As a proof of the improvement it may be stated that the Midland Railway Company carried 10,000 tons more coal in September than in August, to London. But prices do not go up as might be expected with the increased consumption that has taken place. Steam coal has so far gone off well, considering the time of year; but a decline must now be looked forward to, seeing that the busy shipping season is fast closing. Gas coal is in better request, there being some good contracts in hand.

In Sheffield some few branches of the trade are far less active than they have been. Bessemer rails are in good request, and an American order for 15,000 tons has just been given to Messrs. Cammell and Co. (limited), of the Cyclops Works, so that the mills will have a long season of activity. In general railway material, such as tires, axles, springs, points, &c., a steady business has also been done. Not much is being done in armour plates, but it is expected that those made of steel and iron will be adopted at once by the Admiralty, when some good orders for them will be given out to the two firms in the town who are the sole makers at present. Ordinary plates have been in tolerably good request, and some of the mills have been running well on telegraphic wire on Government account. In cutlery some of the houses are fairly off, especially in the better class of goods; but inferior qualities are not so much inquired for. File and saw makers are by no means busy, and less is being done in light agricultural implements. In the latter Messrs. Crowley, so well known as makers of fine malleable iron goods, have been tolerably successful, having taken first-class prizes at several agricultural meetings. Their specialities combine the best materials with good workmanship, and are in every way attractive in appearance and economical in price. At the foundries there has been but little change, and few of them are what may be termed busy, the season for some descriptions of castings, such as those required by builders, having been a poor one. There has been a steady demand for ordinary brands of pig-iron, but by no means equal to the production; there has, however, been rather more doing in hematite, owing to the activity in the Bessemer department.

In South Yorkshire the coal trade is in anything but a healthy state, a large number of miners are entirely idle, and the number is likely to be greatly augmented shortly. More is being done in house

coal, but prices are still low, whilst the men in work are agitating for an advance of wages. Steam coal has gone off well, a good deal having been sent to Grimsby for shipment to the North of Europe; but the closing of the Baltic may now be expected before long, so that less will be done with the Humber ports for some months to come. The proposal of Mr. Thompson to convey the coal from the district to London and Paris *via* Boston Deeps has been favourably received, and that gentleman paid a second visit to Barnsley, and stated that some part of his scheme could be carried out almost at once. At the present time this would be a great boon to our colliery owners, and it is to be hoped that the initial steps will be taken at once.

On Tuesday there was a conference at Barnsley of delegates from the various miners' lodges, for the purpose of considering the best means of raising the wages of the workmen. It was decided to send a circular to each of the colliery owners requesting them to advance the price of coal as the only means of raising the miners' wages. It is needless to say that such a proposal could not be entertained, because it is beyond the power of coalowners to raise the price of coal. They have to compete in the various markets with owners from other districts and must sell at a market price; otherwise they must keep their coal, in which case the miners would be far worse off than then they now are, for they would have much less to do.

Thorp's North Gawber Colliery Company (Limited) appears to be *in extremis*, and a few days ago men were put in possession, when the horses were seized und a restraint for rent and advertised to be sold. A meeting of the company was held in London on Tuesday for the purpose of considering the position of affairs.

A petition for winding up the Dodworth Silkstone Colliery, near Barnsley, was presented last week by Mr. Smith, timber merchant, Hull and Barnsley, and a day for fixed for the hearing. The Colliery is one of the largest in the district, employing nearly 1000 men and boys. Only a short time since the company took possession of the two blast furnaces at Oakethorpe, near Wingfield, in Derbyshire, that had been standing for some years, and put one of the furnaces in blast.

At the Hoyland Silkstone Colliery the men employed in the silkstone pit have received notice that the engagement between them and the owners will terminate on the 20th inst.

The Colliery belonging to the Dromfield Silkstone Coal Company, situate a few miles to the south of Sheffield, was on Tuesday put up for sale by auction, but no bid was made for it.

Meetings of Public Companies.

SIERRA BUTTES GOLD MINING COMPANY.

The ordinary general meeting of shareholders was held at the City Terminus Hotel, Cannon-street, on Thursday.

Mr. Lewis R. Price in the chair.

Mr. John Saul (the secretary) read the notice convening the meeting. The report and accounts were taken as read.

The Chairman said the accounts, which were submitted in the usual form, offered little matter for comment. On the whole, he hoped they would be found satisfactory. The first four months of the year were most uncongenial and severe, offering great impediments to mining, and increasing the cost of production by the extra labour imposed in consequence of the injury to the flumes by the frost and snow. These, with other extraordinary expenses, raised the costs about 10d. per ton, which, on the large mass of ore they had handled came to about 1200*l*. during the year. In spite, however, of all these adverse circumstances they had earned sufficient to pay a dividend of 1s. per share, and to write off 394*l*. 4s. 8d. from the cost of the Independence Mine and water rights. The directors thought it best to apply this small surplus in this way, as there was no object in adding it to the balance, which was left at the same amount as at the beginning of the six months. On two previous occasions they had had to trench on the reserve fund to complete the dividend of 1s. per share, while in this six months the reserve fund remained intact, and they had been able to apply the small sum already mentioned in reduction of the cost of the Independence Mine and water rights. The prospects of the mine had improved during the period under review, and altogether the state of their affairs bore a more cheerful complexion. The upper part of the mine had become too poor and exhausted to offer any inducement to continue work there. A certain amount of unproductive expenditure had been incurred in a thorough exploration of this old portion of the mine, but this was indispensable in order to be assured that they were not leaving anything valuable behind. This portion of the mine had yielded a large sum, and with the economical system of working introduced by Mr. Johns, a profit had been realised from ore previously abandoned as unprofitable. While this part had become exhausted and unprofitable, however, another part had been developed, and gave promise of a successful future. Those in charge of the mine had never lost faith in the 7th level, and it was satisfactory to observe that their efforts in that direction had been successful, and Mr. Johns in his report stated that ore had been found in the 17th, 19th, 20th, and 21st cross-cuts, and also in the rise 117 ft. above the level, and which assured, beyond any reasonable doubt, a large quantity of profitable ore for future working. He thought it was a very important feature that the vein was very strong and well defined, and that the ore was making down in this part of the mine; therefore, while they had a considerable body of ore in the 6th and 7th levels, there was every probability that the 8th level would be found equally good and profitable. Mr. Johns remarked that "although the vein is not found as large and rich as it was in the 6th level, I am confident that good ore and considerable quantities of it will be found both above and below this drift." Connected with this a telegram had just been received stating that the development of the 7th level was progressing satisfactorily, and that the ledge had increased from 2½ ft. wide to 5 ft. wide, and that it was worth $7 per ton for a length of 149 ft., and still continuing—that was to say they had not got to the extreme of the shoot. The ore being found both above and below the drift—that is running up to the 6th level and down in the direction of an 8th level—seemed to offer considerable promise. He did not wish to dwell too much on these discoveries, but surely their prospects were far better than at the date of the last meeting. Their mills had held out well. The two lower mills—the Hanks and the Hitchcock—were in good order, but the Reis mill had been abandoned as it was too old to be repaired, and more particularly because the ore in that part of the mine had become exhausted. The clean-up for July left a loss of 240*l*. This was a serious deduction from the profit of the past six months, not that 240*l*. was in itself anything serious, but they ought to have had 2000*l*. profit. Mr. Johns, however, expressed his confidence that in spite of this drawback the improved condition of the mine, and the economy effected by the curtailment of operations in the exhausted ground, would enable him to earn the April dividend. In August and September the clean-up left a profit of nearly 2000*l*. in each month. In September the total receipts at the Sierra Buttes Mine were $28,227, and the working expenses, including $974 spent on improvements, amounted to $18,805, leaving a balance of about 2000*l*. to the good. A telegram had been received stating that with respect to the discoveries in the 7th level the vein was continuous and solid, the walls remaining unbroken. From this there was reason to hope that a profitable mine might be again opened in depth, for when they got ore in depth it was generally more solid and compact, and less susceptible to geological disturbances. (Hear, hear.) There was ground for hope that the Sierra Buttes Mine might again open up very favourably. They had been under a cloud for some time. In one half-year they paid no dividend, and in another they had to take money from the reserve fund. Turning to the Plumas Eureka Mine, he was happy to say that that property maintained its high character. The accounts had been made up quarterly as agreed, and it would be seen that in the first quarter they earned 12,282*l*. 1s. 3d.; of this they applied 1298*l*. 3s. in clearing off the balance of the cost of the new mill. In the second quarter the profit was 11,335*l*. 16s. 7d., or 946*l*. less than in the first quarter; but as the debt on the mill was extinguished in the former quarter there was no deduction from the earnings on that account, and consequently the total profit on the six months operations was 22,319*l*. 13s. 11d., showing a small surplus, after providing for the usual dividend of 1225*l*. 18s. 11d. There was no reason why this should not be applied to the commencement of a reserve fund, as recommended by the shareholders at the last meeting. The sum was a small one, but the directors had invested it and an addition in the purchase of bonds to the extent of 3231*l*. 5s. 5d., and this would form the commencement of the reserve fund as recommended by the shareholders.

Mr. Frewer asked what bonds had been bought?——The Chairman replied that they had purchased London, Chatham, and Dover Railway arbitration bonds. The directors had full power to create a reserve fund, but they did not wish to do so without consulting the shareholders. The amount of ore milled was 36,636 tons, or some 2000 tons less than in the previous half-year. The cost of mining was 3 cents a ton less, the total reduction in cost being about 3d. per ton. The expenses had now been so much reduced at both mines that any further saving could not be expected, but their expenses compared very favourably with those of other mines. Even the slight saving of 3d. per ton made a difference of some 400*l*. a-year—(hear, hear)—and this would give some idea of the importance of economy. During the period under consideration there was scarcely any portion of the mine where the work had not been impeded by the severity of the weather and the amount of snow. They had escaped very well, but it had been an anxious and trying time both for Mr. Johns and his staff. One effect of snow had been to prevent the taking away of the ore from the 76 mine, and to suspend work at the Rough and Ready. The general operations of the mine continued to be satisfactory. The highest point was the Rhoda tunnel, which had not been worked for some time, but Mr. Johns entertained an idea that ore ought to be found in the unexplored ground at the upper end of this tunnel, and a cross-cut having been made, they were informed on Sept. 4 that good ore was being taken out from a bunch a little beyond the cross-cut. In a drift in the Mohawk tunnel from No 3 winze there was a vein of $10 ore. Very little stoping had been done on it as yet, but this ground will soon be brought into requisition, when Mr. Johns expected good results, and that the ore from this drift would tend to improve the monthly average. In his report Mr. Johns gave a long description of the Mohawk tunnel, and his anticipations with regard to it. One curious feature in it was that after a somewhat serious dislocation, by which the vein appeared to have been thrown nearly at right angles to its usual course, it further on resumed its ordinary direction, and on Sept. 4 Mr. Johns wrote that it had broken at a place in the vein, and there was but little ore, but they expected in the course of a few feet to meet the ore again. This break corresponded with one they had in the level above. Mr. Johns in his latest telegram stated that the mine was looking very well, particularly in the Mohawk tunnel. The report showed that the stopes had yielded about as well as in the previous half-year, and where the vein had been tested the same solidity and prospects of continuity had been met with. He trusted the shareholders would be satisfied with the position and prospects of the property. The addition of 20 stamps to the Mohawk mill was not really an increase, as the stamps had been transferred from the Mammoth mill, as they could be more usefully employed at the lower mill. A furnace was being built for roasting the sulphurets, but Mr. Johns wrote on Sept. 4 that as they had began excavating it was doubtful whether this work could be accomplished before the winter set in. The clean-up of the Plumas Eureka Mine for the month of September had been $55,351, including about $3000 for the three-monthly rent of the arrastras. The expenses had been $25,361, so that the profit on the month's operations was about 6000*l*. (Hear, hear.) He thought that, on the whole, the state of the mine showed improvement, and that its position would be considered satisfactory by the shareholders. In conclusion, the Chairman moved the adoption of the report and accounts.——Mr. John S. Neall seconded the motion, which was carried unanimously, and without discussion.

The Chairman moved the declaration of a dividend of 1s. per share on the Sierra Buttes shares, payable on and after the 15th inst.——Mr. Pilcher seconded the motion, which was carried.

On the motion of the Chairman, seconded by Mr. C. Russell Frewer, a dividend of 3s. per share was declared on the Plumas Eureka shares, payable on and after the 15th inst.

The meeting then closed with a vote of thanks to the Chairman and directors.

LAST CHANCE SILVER MINING COMPANY (LIMITED)—IN LIQUIDATION.

An extraordinary general meeting of shareholders was held at the offices of the company, King William-street, City, on Tuesday, for the purpose of confirming the resolutions passed at the meeting held on Sept. 27. Mr. John Porter in the chair.

The Chairman said—Before we proceed with the business of this meeting I should like to say a few words. This will be the last time I shall meet you respecting the Last Chance Company, which is now in liquidation, and I would advise you to take up your shares in the new company, which I believe will prove a great success. There is a good board of directors, and I believe they are men of high standing. I am told that the new board have already sent out a first-rate man to examine and report upon all the properties belonging to the Last Chance Consolidated Mine, which is the name of the new company. I think I need not keep you any longer, but read the resolution.

It was proposed by Mr. Whaley, and seconded by Mr. Stocker, that the resolution passed at the last meeting be confirmed, which was carried unanimously.

The meeting of the debenture holders was then held, and the resoultion which was passed at the last meeting was confirmed, Mr. Stocker proposing and Mr. Whaley seconding, which was also carried unanimously.

A Shareholder asked Mr. Porter what he thought the profits would be when the mine was in full work?——The Chairman referred to the last report of Mr. Adley where he stated that 2000*l*. per month was a very low estimate for the Last Chance Mine; but now we had taken the other mine they ought to produce at least 40,000*l*. per annum, which would be very good interest for the outlay.

The usual compliment was paid to the Chairman, and the meeting separated.

LONDON AND CALIFORNIA MINING COMPANY.

A half-yearly meeting of shareholders was held at the Cannon-street Hotel, on Thursday,

Mr. Lewis R. Price in the chair.

Mr. J. Saul (the secretary) read the notice calling the meeting.

The Chairman said: Gentlemen, since we last met another six months of anxious expectation and disappointed hopes have elapsed. You will see by the accounts now submitted to you that we began the half-year with a balance of 19,337*l*. 7s. 11d., and that this is now reduced to 15,013*l*. 0s. 5d. This balance is not, however, cash. In order to see what funds we had at the end of the half-year we must look at our liabilities, and deduct them from our cash in hand. Our London assets consisted of investments, cash on deposit, balance at bankers, and cash at office, amounting in the aggregate to 10,499*l*. 14s. 1d., from which we had liabilities to deduct—Excess of liabilities in California over cash in hand there, 461*l*. 6s. 10d., and bills accepted 2000*l*.; together, 2461*l*. 6s. 10d. Deducting this 2461*l*. 6s. 10d. from our assets, we have remaining on June 30, the date of the accounts, 8038*l*. 12s. 3d. Since that date we have accepted drafts for a further sum of 3000*l*., after providing for which there will only remain 5000*l*. We cannot, of course, state the sum exactly, as we cannot know the state of the Californian accounts, which vary daily. The monthly expenditure has been about 1000*l*., but we are in hopes that Mr. Johns may see his way to reduce this rate—to what extent this is possible we cannot at the moment say. Mr. Johns has been made aware of our financial position, and no doubt can be entertained but that every economy will be used. We must now review our position and prospects as regards the mines themselves. In the original Amador some promising streaks of excellent ore were found at the bottom of the east shaft, which is 875 deep. Hopes were naturally excited that these might lead to something of permanent value. The ground in every direction was explored, but I regret to add only to lead to fresh disappointment. The only other point of interest in this mine is the deep cross-cut starting from the bottom of the east shaft just mentioned. This cross-cut is driven, as perhaps you may remember, to explore the ground below the point where ore to some extent (100,000*l*.) was found in the upper works. It will be about 300 ft. below those stopes. I must call your attention to the extract from the same letter of Aug. 17, page 4 of our report. Mr. Johns says—"Until the cross-cut shall have reached the slate but little can be said of the prospects for finding a paying vein, or of finding any vein at all: but if a permanent vein is to be found at all I amfully convinced it will be found west of the greenstone. The distance yet to be run to reach the slate depends on the dip of the greenstone; and if the dip of its west wall corresponds with that of the east one the cross-cut will cut into the slate in a very few feet." It is easy to conceive with what reluctance a miner abandons a work, and I therefore feel sure, painful as the conclusion may be, that no hope can be entertained of this mine, except the deep cross-cut should reach good ore to the west of the green stone. The whole course of our work in this mine has been so unsatisfactory and disheartening that I do not venture to build any hopes even on the result of the cross-cut. In the Seaton and Maryland Mines we have been equally unsuccessful. The column of ore in the old workings of the Seaton has turned out to be very small, and there is nothing as yet found that would warrant an expenditure on the erection of pumping gear, although purchased and continuing work in the old shaft. These mines you will bear in mind were selected by Mr. Johns on the strength of their general repute, but more especially on Capt. Hoskin's report, who (now at the Eureka Mine) having formerly been employed at the Seaton, stated that at the time that work was suspended by its former owners, there was good ore in sight. Our area for selection of a mine was limited by our Memorandum of Association to "mines contiguous to or convenient to be held with" our first purchases, and the Seaton and Maryland were the only properties coming under this category that seemed to offer a prospect of success, or to come within our means financially. That Capt. Hoskins was a good practical miner and an honest man, gave a value to his statements which the result has not, however, borne out. Some ore certainly has been found yielding $15 per per ton, but in such small quantity as to render it of no value, and what small quantity remains is only $6, and will not pay to extract. Mr. Johns paid a special visit to these mines. The result of his examination he communicated in his letter of Aug. 17, from which I have already quoted in speaking of the Amador. It is perhaps unnecessary to trouble you by reading his remarks. It may suffice to say that he was most unfavourably impressed with his visit. He determined to abandon the old workings and confine his efforts to the exploration of new ground in the direction of the Maryland. In order to have some confirmation of his views before finally acting on them, he sent Captain Hoskings down to examine the mines, and I am very sorry to say that Mr. Johns' impressions were to the full corroborated by this second examination. All hope of success or profitable working as far as that special portion of the Seaton pointed out by Capt. Hoskings as containing pay ore, and which statement formed one of the principal inducements for its purchase, has vanished. If the concurrence of opinion of these two gentlemen be accepted as condemnatory of this part of the mine and as conclusive of its worthlessness, their agreement on any other point should have proportionate weight. I will, therefore, now give you the substance of their proposals for further working, based on the idea that there is yet the makings of a good mine in the Maryland, and that exploration can be carried on in this direction without impediment from water. They propose to sink the new shaft 200 ft. more, which will make it 300 ft. below the adit, and then run north to explore the northern part of the Seaton and also the Maryland, with respect to which operation Mr. Johns says in the often mentioned letter of August 17—"We think the prospects for finding profitable ore north at this depth are good, especially in the Maryland, because we have west of the greenstone in the Maryland a considerable width of highly mineralised slate that is full of seams and threads of quartz, and some of which prospect well. This slate is very similar to the slate of the Keystone, and it is the concentration in depth of the innumerable threads and seams of quartz seen at the surface that has made the Keystone Mine." They hope the work may be completed as far as sinking the shaft goes in about three months. On Sept. 15 Mr. Johns writes, after Capt. Hoskings had examined the mines, that he endorses fully his opinion as to their future working; and further on in the same letter—"The sinking of the new shaft is resumed, and work will be performed as fast as possible, and we hope before the April meeting arrives we shall have something to lay before the shareholders." I should here add that Mr. Coulter has expressed great confidence in the future excellence of the Maryland. We know that Mr. Johns and Capt. Hoskings have formed their opinion on a careful inspection of the mine, but are not at present informed how Mr. Coulter has arrived at the same conclusion. I have shown that the funds now available for the proposed work amount to only 5000*l*., and must consequently become exhausted in the course of a few months, when, as our company is one of limited liability, we should have to wind up. The alternative is to procure such further supply of money as would enable us to tide over till our April meeting. This scarcely seems feasible in England. An issue of debentures for the requisite amount would be the only course, but we do not think this would be attended with success; and, therefore, as far as the directors can see, no resource is left them beyond the small cash balance in hand. In this position of affairs Mr. Coulter has come forward with a proposal to furnish the requisite funds at a moderate interest on the security of the property. The directors, however anxious they may be to carry on the work, did not feel themselves authorised to accept Mr. Coulter's liberal offer without the express sanction of the shareholders first being obtained. We are authorised by Mr. Coulter in a recent letter to make this offer known to you, and it now remains for you to decide on the course to be pursued. Should this supply of money lead to the discovery of good ore all the gain after repayment of the loan would be yours, while the loss from failure would fall on the lender. He (the Chairman) moved the adoption of the report and accounts.——Mr. Wright seconded the resolution.

A short discussion ensued, in which several shareholders acknowledged the exertions which the directors had made to make the company a success: and in reply to a suggestion by Mr. Bolton,

The Chairman said the directors would be only too happy to receive any shareholder at the office, and receive any suggestion that might be made.

The resolution was put and carried.

Mr. Neall and Mr. Howie were re-elected directors, and the meeting closed with a vote of thanks to the Chairman and board.

ARENDAL MINING AND SMELTING COMPANY

An extraordinary general meeting was held at the office, Austin Friars, on Wednesday,—Mr. H. W. Lamb in the chair.

The notice convening the meeting having been read,

The Chairman stated the meeting was purely formal to confirm the resolutions creating new capital, which, after full discussion, had been unanimously adopted at the shareholders' meeting held at Newcastle on the 25th ult. He was happy to say they had received a very encouraging report from Capt. Daw, sen., who had just arrived at the mines to resume the management. After again inspecting the workings, Capt. Daw confirmed the opinion he had repeatedly expressed to the shareholders here, that he would be able to make the mines pay very well. By the end of the month it was expected that the other (Bolistad) mine would be clear of water and stone, when larger returns would be made, many tons of ore being already broken in that mine. A cargo of ore, per Mary Owen, arrived in England last week, the assay of which had not yet been received, and about a week hence a further 200 tons would be ready for shipment, to be followed in November, if the weather remained open, by a similar amount. The new dressing machinery would be forwarded this week, and as soon as this was erected, the returns would be increased. The scheme now proposed for obtaining the further capital required had met with the general approval of the shareholders, and he trusted that there would be no delay in placing the directors in a position to carry on the works with the vigour necessary to speedily bring the mines into a dividend-paying position.

The following resolutions were then unanimously confirmed, viz.:—

1.—That the special resolution passed at the extraordinary general meeting of shareholders, held on Aug. 6, 1880, and confirmed at the extraordinary general meeting of shareholders held on Sept. 2, 1880, for increasing the capital of the company by the issue of 6000 new shares of 4*l*. each, be rescinded.

2.—That the capital of the company be increased from 48,000*l*. to 60,000*l*. by the issue of 12,000 new shares of 1*l*. each, such new shares to be entitled to a preference dividend at the rate of 6 per cent. per annum out of the profits available for distribution in each year, and to participate *pro rata* with the holders of the ordinary shares in any surplus of such profits which may remain after payment of a dividend of a like amount upon such ordinary shares; and that such preference shares shall also have a preference in the assets over the ordinary shares in case of liquidation.

3.—The directors shall be at liberty to issue the whole or part of such new shares in such portions and at such times, and the amount thereof shall be payable in such way as the directors shall in the exercise of their discretion consider most advantageous to the company, it being understood that any preference shares remaining after being first offered to the shareholders shall be offered to those who have already subscribed.

The meeting then terminated with the customary compliment to the Chairman.

[Note.—It is announced since the meeting that the assay of the cargo of ore per Mary Owen has now been received, giving the following results:—154 tons, 7¼ per cent.; 13 tons, 10½ per cent.; 3 tons slime ores, 6 per cent.; and 27 tons fine ores, 3½ per cent., or an average produce, including the slimes and fine ores, of about 6⅞ per cent., and valued at about 725*l*.]

DEVON COPPER AND BLENDE MINING COMPANY.

This company has recently been started with a capital of 50,000*l*. The sett has been obtained for a lease of 21 years, on property belonging to Lady Call, situate in the parish of Lamerton. The concern was started in 1842, and worked successfully for ten years, when on account of a dispute about the dues and the small demand in the market at that time for blende, it was abandoned, although some time previously a thousand shares had been sold for 60*l*. each. It appears to be the general opinion of competent judges that the mine will prove quite a success, especially considering the increased demand for blende. On Tuesday, a large number of shareholders and others repaired to the mine to witness the ceremony of stating the engine, which was christened by Mr. W. Criper, chairman of the directors, who said they had met to start a new engine, and, according to custom, he would begin by giving it a name. Mr. Criper then yclept the engine "Call," after Lady Call, who owns the property on which the mine is situate, and threw into the shaft a bottle of sherry, which not being broken, was secured by a passer-by to be cracked at leisure. The speaker went on to remark that this was quite an event in the history of the district—an event which he was sure reflected great credit on the neighbourhoods of Tavistock and Lamerton for the efforts which had been made by the residents to bring about the starting of the mine. It was about 18 years since the old mine was stopped, chiefly through a dispute between the proprietors and the lord of the soil. At that time the blende which existed in the mine was not of much value, but now it would realise from 3*l*. to 3*l*. 10s. per ton. In the upper levels there was a vast amount of wealth, which would soon be brought to the surface, and he was sure the mine would prove one of the most successful in the neighbourhood, not excepting the Devon Great Consols. He complimented the manager and engineer on the expedition they had shown in making the preliminary preparations, which were only commenced about a month ago, and now the engine appeared to be in first-rate working order They had laboured early and late, and had shown what snergy can do. (Applause.) An adjournment was afterward made to the Blacksmith's Arms, Lamerton, where an excellent spread was provided by Host Howard. The Chairman, in proposing "Success to the Devon Copper and Blende Mining Company," said it was an unusual thing in that district to see an engine started, and he had witnessed the proceedings that day with much pleasure. The manner in which the mine had been started, and the gentlemen connected with it, were sufficient guarantee that the undertaking would prove a success. Blende, about seven years ago, was not a commercial article, but now it would make as good prices as copper in the market, and the blende which existed in that mine was very rich in silver. They looked forward to raising thousands of tons of rich blende, which would show how rich the district was in mineral. At least 200 tons of copper were sold by-monthy till the mine was stopped, and when everything was in working order he had no doubt that they would be able to dispose of 300, 400, or 500 tons of ore by-monthly. The ground was easy and labour cheap. The mine was started in a perfectly legitimate manner, and there was not a single director who had not paid for his shares. Having observed that Devon Consols, during the 35 years of its existence, had paid 1,200,000*l*. in dividends, the speaker observed, that situated as the mine was near Devon Consols, and with the earlier results which had been shown, there was every probability of its rivaling Devon Great Consols in the riches it had achieved. He was positive the district itself had only been scratched over, and he believed that mines which were started 30 years ago only showed indications of the great wealth that existed beneath. It was a saying that it took two or three sets of adventurers to make a mine prosperous, and as this was the second set here, he hoped the undertaking would prove a success, and that by another twelvemonths they would be in receipt of a handsome dividend. (Applause.) The Chairman, in giving the healths of the manager, Capt. Skewis, and the engineer, Mr. W. Mathews, observed that it was well known that no man had made a greater effort than Capt. Skewis to bring capital into the district, and through his instrumentality many mines had been set afloat. Mr. Mathews also took a great interest in mining, and had spent thousands of pounds in promoting it. He therefore felt sure the company would experience pleasure in drink the healths of those gentlemen.

Capt. Skewis, in responding, said the best testimony went to confirm the opinion that the mine would prove profitable as soon as the water was pumped out, and the mine was more developed. On Saturday he saw a gentleman who knew the mine well when it was in full work, and he said that whenever the water was out a large quantity of ore would be discovered, and the mine would show itself to be a good and profitable concern. He (the speaker) came into the district when the mine was in full work, and remembered that large quantities of copper ore were sent to the quays for sampling just before the mine was suspended. He, therefore, had great confidence in recommending the mine to the public as a profitable investment. He thoroughly believed that whatever capital was expended in the mine would be paid back to the adventurers with handsome interest. Capt. Skewis spoke of the importance of co-operation on the part of the employers, and said the principle he adopted in paying men was to give them whatever they really were worth, irrespective of their individual circumstances. He expressed his conviction that there was work enough for all the labouring classes in this county to earn as much money as they could in Australia or America if they would only exercise the perseverance and industry which men generally showed when they emigrated to those countries. He could not say exactly when they should reach the bottom of the mine, but every effort would be made to do so as speedily as possible.

Mr. Mathews also responded, and said he believed the engine which had been started that day would do the adventurers justice and himself credit, and that it would soon fork the mine. Referring to the fact that the engine was not started before it was witnessed by the adventurers that morning, Mr. Matthews humorously observed that it was something like setting a race-horse to jump without giving him the preliminary canter. Had preparations been made on the previous day everything would have been in full swing, then up would go the flag, and away the engine would start. (Laughter.) The mine was a highly productive one for many years before it was suspended. At that time blende was said to be detrimental to copper, and so it was not only not paid for when mixed with copper, but money was deducted for it. New dressing machines had been brought into use since then, and blende having come into commercial value, it would no doubt prove quite as productive at that mine as copper itself. He felt sure that the manager and working men would do their best to bring the mine to a successful issue.

The Chairman gave the health of the shareholders, and coupled with it the name of Mr. Freeman, of London, who he said was one of those energetic gentlemen who had been the means of bringing the mine to its present state, with whom the late Mr. Smith—who from ill-health was unable to attend that day, but with whom he was deeply sympathised. Mr. Criper spoke at some length against the practice which prevailed of taking millions of money from this country to speculate in foreign enterprises. Campbell said "Distance lends enchantment to the view," and he exposed the reports of those foreign concerns which people read, dressed up as they were in gaudy language, were believed by them to be perfectly true, and so they sent millions abroad to develop wealth there when they had within the immediate borders employment for every penny, which if expended here would meet with ten times the success which was experienced in foreign investments. In this district there was unbounded wealth, and they only wanted capital to develop it. For instance, twelve months the spirit of mining enterprise has been more manifest. The Gunnislake Clitters had shown itself to be a mine of great wealth, and would probably continue so for a century to come. The Kit Hill and Holmbush mines were

also promising concerns, and the Prince of Wales was destined to play a conspicuou part in mining. They were therefore glad to see gentlemen like Mr. Freeman interested in the mining of the district.

Mr. Freeman explained that his connection with the mine had arisen from the wonderfully cogent account he had received of it, an account which he felt positive was a correct one, for those who could tell a tale that was not true, and make it so thoroughly hang together in detail, must be a most clever set of men. The evidence seemed conclusive enough to make him think it worth his while to embark capital in the concern, and he was in a position to say that it should not fail for want of capital. (Applause.) He concluded by stating his intention of continuing his interest permanently in the mine, and expressed a hope that he might meet the shareholders and men on many future occasions.

Captain Skewis, by the chairman's permission, proposed the health of the miners, coupling with it the names of Samuel Hockaday and James Stacey.

Samuel Hockaday, in responding, thanked the gentlemen for the kind way in which they had proposed their very good health. He believed they had a good mine in the Devon Copper and Blende. In fact he knew by working there, before it was stopped by the late company, that thousands of tons of blende were broken and put to stull; also that a lode of copper ore was left untouched in the bottom of the mine.

HONY AND TRELAWNY MINING COMPANY,

The Chairman, Mr. Brockelbank and Mr. Palmer (directors), and Capt. Josiah Thomas, of Dolcoath, Captain Hancock (the manager of the mine), and Messrs. Loam and Sons, engineers, met at the mines on Friday last, to consider and decide upon the best shaft for the permanent drainage and re-opening of these extensive and important mines. There are two main pumping shafts in Trelawny Mine, both well placed, and suitable from their respective positions for the effective drainage and separate working of that mine; but the primary object of the present company is the drainage and development of the Hony sett; and, as the drainage will be concentrated at one shaft, its selection for this purpose is of the first importance, and requires the most careful consideration. After a minute survey of the surface and evidence collected from the miners who formerly worked in the mines, the meeting was adjourned to Liskeard, where the former pitman was examined. In his evidence he stated that Trelawny shaft was 170 fms. perpendicular, and Smith's 108 fms.——The Chairman then said the matter for their consideration and discussion was of the greatest importance, as affecting the drainage and development of the Hony ground, and he called upon Mr. Loam, their engineer, to explain it in detail.

Mr. Loam said the question must be considered in its mechanical and its mining bearings. With such a mass of water, which he estimated at an aggregate of 110 million gallons, and an influx of 670 gallons per minute, it was of no mechanical importance at what point or in which shaft the pumps were placed; but that the shaft which offered the best facilities for their rapid fixing and speedy and thorough drainage would be economically and mechanically best. Trelawny's shaft being perpendicular 170 fms., and Smith's 108 fms., would leave the mechanical preference with the former, but its distance from Hony land about 400 fms., and the necessity of pumping the water for dressing that extra distance more than counterbalanced the advantage of its being perpendicular; and, as Smith's was perpendicular 108 fms., the mechanical advantages to this depth would remain with Smith's shaft, from its close proximity to the new sett. The purely mining part of the question he must leave, he said, to Captains Thomas and Hancock, who pointed ont that the lower levels from Trelawny shaft were not driven north to Smith's, and would not draw Hony sett to the bottom; and there was the probability that some of the shallower levels might be choked, and their clearance would take time and money. To clear these and to drive the deeper levels would more than counterbalance the advantages of Trelawny shaft, with its greater perpendicular. Added to this, there would be the additional cost of pumping the water nearly 400 fms. for dressing purposes at the surface.

The discussion was exhaustive, and clearly proved that Smith's was the proper shaft for the purpose, and it was unanimously decided to adopt it.

At the dinner the Chairman, in proposing "Success to the Mine," referred to the complete and satisfactory discussion of the day, which, he said, had very much gratified himself and colleague, and they would have great pleasure in reporting it to the board, who, he felt sure, would share their satisfaction. He also said it had increased his confidence in the mine, its future, and in the skill and talent of their staff.

Mr. Loam, in reply, said the meeting had afforded him great pleasure. The placing of the engine was the first and most important step, and he had felt the necessity of ascertaining all the facts, so as to assure its proper position. This discussion had elicited those facts, and would now enable them to proceed with complete confidence. He was also pleased to find the Chairman and his colleague were satisfied with the result. He said some fears had been expressed that the water in the mine would prove too much for the engine and pumps, but he assured them these fears were groundless. The engine, the largest of its class, was of ample power and of the best construction and quality, and, with the 20-inch pumps, would at 5¼ strokes per minute easily deal with the inflow, and leave ample surplus for the drainage of the accumulated mass; and that the water, from its being concentrated at one point, would prove of great value and power for the various mechanical purposes required on the mine. He was very proud in being their engineer—its duties would be a labour of love to him and his son, and no effort of theirs should be spared in promoting the efficiency and economy of their machinery. He also felt the greatest confidence in the success of the mine, and in the energy and judgment of their manager, Capt. Hancock. The new ground had always been prized by the best practical miners of the locality, and, looking at its position between two productive mines, he did not know of a more valuable piece of ground, or one that offered such facilities for rapid and successful development, and he congratulated the directors and proprietors on their success—after so many had tried and failed—in obtaining it.

Capt. Thomas, who represents one of the lords, approved of the selection of Smith's shaft, which was near the new ground, and would enable them to reach and develope it most effectively, and speedily make returns of ore.

Capt. Hancock concurred with the remarks made by Capt. Thomas, and would apply his best energies to the speedy and econonomical development of the mines, and, with Mr. Loam, had no fear of the water, and was confident of success.

The meeting then closed, the directors returning to town.

THE VAN MINES—MONTHLY REPORT.

Oct. 14.—The ground in the 120 west is unchanged since my last—strong, wet, and showing at times good patches of lead. We have every reason for believing that we are driving alongside productive ground here, and as soon as we have communicated with the 100 winze (sinking below the 105), which is a few fathoms ahead of us, we shall cross-cut to prove the width and value of the lode. The 105 west is still unproductive, but we hope ere long to reach the ore ground passed through in the level above, which in that level was worth from 10 cwts. to 1 ton 5 cwts. per cubic fathom. The 100 winze, sinking below the 105 west, is down 6½ fms. In a very good lode, producing at present about 2 tons of lead ore per cubic fathom. The ore ground which we reported a month ago as being worth 3 tons per cubic fathom has dipped into the hanging of the winze; but when we cross-cut at the 120 we hope to find it again. The indications presented in this winze are very favourable for the extension of the ore ground westward in the deeper levels. The driving of the 90 west will be resumed shortly. The cross-cut just behindt he present end is driven 30 ft., but as yet discovered nothing of value. The 80 has reached the line of Edward's shaft, and to-morrow the men will start crossing to get under the perpendicular before they can commence rising. The stopes throughout the mine are without material change since my last report, working with the same number of men and with usual regularity. Permanent levels are pushed forward as usual.

North Lode: The cross-cut for the north lode is driven 52 fms., the last 3 fms. of which is in the south part of the lode; so far, nothing of value has been seen. The lode is strong, letting out much water, and intermixed with spar, carbonate of lime, and spots of copper This lode being about 70 ft. wide, we have yet ample ground for improvement.

Surface: Everything at surface is progressing regularly; dressing going on as usual. Our four-weekly produce sold to-day is 200 tons of lead ore, and 100 tons of blende.

The Farm: We have secured all our harvest in first-class condition, and the crops are very good.—W. H. Willams.

West Basset.—At the three-monthly meeting on Tuesday the accounts showed a profit of 1492*l.* 8s. 9d., increasing the credit balance to 1959*l.* 16s., out of which a dividend of 5s. per share was declared. The agents' report was submitted, and the Chairman remarked that, as indicated in the agents' report, a large outlay had been made during the past three months in laying open the eastern part of the mine, and in drawing the water to the 160 fm. level at Thomas', and in the course of a few weeks it was expected to reach the bottom of the Thomas' shaft, which had 'been under water for many years. But for this the profit on the quarter's working would have been larger, and the cost per ton of producing black tin proportionately less. However, the discoveries of tin in that portion of the mine bade fair to realise the most sanguine expectations. There was a large extent of ground on the flat lode 200 fathoms in length between Percy's and Thomas' shafts entirely unexplored, underlying the rich deposits of copper ore from which the great profits of the mine were formerly made. In this they looked forward to finding some good bunches of tin. During the past three years they had somewhat uphill work, and in order to bring the mine into its present position heavy calls amounting to 14,000*l.* had been made on the adventurers. The confidence generally felt in the ultimate success of the undertaking determined the committee to persevere, and in this they had been nobly supported by the adventurers. The committee wished to express their sense of the confidence which had hitherto been accorded to them. Had this mine succumbed the remainder of the group of mines must assurredly have gone with it. The question of amalgamation with South Frances was discussed, and it was resolved that the report of the committee be adopted, and that the committee be empowered to enter into negociations (the details to be hereafter submitted to a special meeting of the shareholders) with a view to amalgamation.

North Levant.—At the four-monthly meeting of shareholders, held at the mine, on Oct. 8 (Mr. R. Boyns in the chair), the accounts showed a profit on the four months' working of 12*l.* 12s. 1d., increasing the credit balance to 505*l.* 15s. 9d. The agents reported that from present appearances they calculate the returns of the coming 16 weeks will be equal to the past. It was resolved "That Capt. Henry Eddy having accepted the position of manager of Wheal Uny, the directors desire to record the high appreciation of his very valuable services during the past 10 years, their regret at his removal, and their best wishes for his future success." Mr. W. H. Humphries was appointed underground agent in place of Capt. Eddy. Mr. R. Boyns said that there was not another mine in country, in the matter of the accounts, that was worked in a better way than North Levant. There was nothing like it under the sun—that they should spend 1000*l.* in labour costs and only 100*l.* in merchants' bills. He mentioned this fact in Redruth the other day, but he had the greatest difficulty in getting people to believe it, and he would now send them a balance-sheet in order that they might see the thing for themselves. Their merchants' bills were exceedingly light, and that being so, and in the hope that they might yet have the ground that really and naturally belonged to them, he did not at all despair as to their future position. He was not particularly sanguine that there would be an immediate improvement of any consequence in the price of tin, but he was confident that the improvement would come, and that when it did it would be a substantial one. Capt. White expressed an opinion that rockborers would be a great boon to the parish, and that they would be the salvation of Levant. It would not only lead to a large saving in expenditure, but would also provide better ventilation for the men, which was a matter of great importance. At present the extra expense which they were obliged to incur occasioned them a little loss, but he was sure they would derive benefit from it in the coming year. Mr. Waddington had complete confidence in the future of tin, and said he would not sell any tin for 12 months in advance for 10*l.* a ton above present prices. He believed boring machinery would tend materially to the successful development of Cornish mines; all the more so because in a few months they would be able to obtain their dynamite at about half the cost they were now paying for it. He was quite convinced that there brighter days in store for them, and that the worst days were past.

St. Aubyn United Mines.—A meeting of the shareholders was held at the mine on Oct. 7—the Purser in the chair. The accounts for the four months ending August showed a debit balance of the sum of 714*l.* 11s. 7d. Capt. John Jennings was elected agent of the mines at a salary of eight guineas per month. A call of 1*l.* 5s. per share was made.

[For remainder of Meetings, see to-day's Journal.]

METAL TRADE IN AMERICA—STATISTICS OF TIN.

July 1, 1880—Stock in all hands	Tons	2725
Arrivals in New York and Boston, July 1 to Sept. 30—		
Straits and Malacca	1490	
Australian	300	
Billiton and Banca	5	
English L. and F. and refined	40	=1835
Tons		4560
Consumption—July 1 to Sept. 30.....	3000	
Shipped to Europe	205	=3205
Stock Oct. 1, 1880		1355
To arrive, Straits, July to Sept., shipments sail and steam	1620	
Billiton afloat	30	
Australian afloat	—	=1650
Total, spot and to arrive		3005

From the above figures it will be seen that since the publication of my last circular (July 1) our deliveries of tin for consumption and export, say 3200 tons, have been replaced by new arrivals of all kinds to the extent of only 1835 tons, about one-half, consequently our available stocks on the spot in all hands are at present reduced to somewhat over one month's consumption, with about an equal quantity afloat by steamers due October and November, and the balance by sailing vessels, due between the end of November and the beginning of January, 1881.

High prices in the Eastern producing countries, and the increasing demand for export to China from Penang, have prevented our importers during the last three months from adequately providing for our wants. Under these circumstances our market has of late maintained itself with but slight fluctuations in spite of the heavy drop and constant variations in the London quotations.

During July the price of Straits tin gradually advanced from 18¼c. in the early part of the month to 21¼c. at the close, falling during August to 20c., recovering slightly during the early part of September, when, owing to the heavy break in London, prices receded to 19¼c. Since then a further improvement has to be reported, and we close to-day very strong, spot Straits being firmly held at 19¾c. to 20c.

The question now arises—have our importers and dealers acted wisely; may they not have been over cautious in not supplying this market in accordance with its necessities? We find that during the last three months hardly any Australian tin has been secured for this side. Of Billiton since February sale only 30 tons have been shipped to this port, and our arrivals of Cornish tin since July 1 have been only about 50 tons.

The only explanation we can offer is that many of our operators hoped during the depression in London to secure there a large line of tin at such low prices that they could better afford to pay the differential duty of 10 per cent. than to go on competing with the Chinese buyers in the Eastern markets. Unfortunately for this market the depression in Great Britain was but of very short duration; besides, at the lowest point very little was actually obtainable, and prices have since then recovered 6*l.* per ton, thus preventing importation except at a considerable loss on our present quotations.

Thus valuable time was lost, for while our dealers were watching the London market for the purpose of securing a considerable quantity they naturally abstained from sending their orders to the East Indies; hence the small shipments advised during the month just passed—only 450 tons, against 800 tons in July and 875 tons in August.

The question now arises—how under these circumstances shall we be able to provide for our consumption from now until the end of the year, during which period we shall require at least 3000 tons? To our knowledge about one-half of our stock on the spot is in strong hands, and not available except at prices far above present quotations, and of the floating quantities fully two-thirds are in a similar position.

By preparing our friends on all sides for what may happen they may avoid repeating the mistake made about October, 1879—to enter the European markets with a rush, and by that means injure their own interests by forcing prices over the legitimate value of the article.—*New York, Oct.* 1. Edward P. White.

PIG-TIN STATISTICS.

Stock of tin in all hands, Sept. 1, 1880 .....Tons					1735
Imports in September (all ports):—					
New York—Straits and Malacca.....Tons				495	
Ditto	Australian			100	
Ditto	Billiton			5	
Ditto	English			20	=620
					2355
Consumption in September					1000
Stock on hand Oct. 1					1355
To arrive—due:		Oct.	Nov.	Dec.	
Straits and Malacca—sail		—	225	25	
Ditto	steam	595	620	150	
Australian		—	—	—	
Billiton		—	30	—	
		595	880	175	=1650
Total on spot and to arrive .....Tons					3005

New York, Oct. 1. Edward P. White.

Pig-Iron Production.—From successive volumes of Mr. Hunt's Mineral Statistics a table has been compiled which proves that the enlargement of the average yield of British blast-furnaces which has been in progress for some time is now checked. It is shown that the blast furnaces in England produced on the average each 214 tons weekly in 1875, 228 tons weekly in 1876, and increasing to 264 tons; weekly in 1878; while the Mineral Returns just issued show that last year the output fell to 245 tons. In Wales there was also a check; the average production of each furnace weekly was 133 tons in 1875, rising rapidly to 245 tons per week in 1878, but falling last year to 232 tons per week. In Scotland, however, the production varied more it was 170 tons per week in 1875, and rose to 178 tons in 1876, with a declension to 173 tons in the following year. In both the last two years it has increased, but for last year the total output—185 tons weekly—was below that of either of the other producing parts of the kingdom.

THE COPPER TRADE.

Messrs. Rickards and Budd (London, Oct. 11) write:—There is little animation in the general market; both speculators and consumers are waiting for the hoped for demand for metals from America. If this should come in any quantity, even though no copper is required for that country, we shall certainly feel the influence in an increasing demand both for European and home consumption.

	1878.	1879.	1880.
Exports—First nine months.			
English copper—wrought and unwrght...Tons	23,090	24,414	22,819
Foreign copper—unwrought	9,440	18,006	11,961
Yellow metal	11,235	12,740	12,131
Total	43,765	50,160	46,911
Imports—First nine months.			
Copper in ores	10,118	8,843	10,150
Copper regulus and precipitate	14,266	19,015	19,938
Bars, cake, and ingots	30,692	34,708	29,504
In pyrites, estimated	11,205	9,233	13,220
Total	66,281	71,799	72,807
Total stocks in Europe and afloat, Oct. 1	52,053	59,238	60,967

Messrs. Vivian, Younger, and Bond (Oct. 8) write—Without any fluctuations of importance during the month a rather large business has been transacted in Chili bars from 61*l.* 5s. to 60*l.* 5s. The market is easier at the close, though without pressure to sell. There is a considerable falling off in the Chili charters during the first nine months of this year, say 7750 tons. The quantities being 31,850 tons against 39,600 tons in 1879, There has been a fair business for India, but partly owing to the Indian holidays there is now less demand.

According to the Board of Trade Returns for the United Kingdom the imports and exports of copper during the first eight months of the following years, estimated in fine, were as follows:—

	1880.	1879.	1878.
Imports.			
Copper in ores and pyrites .....Tons	21,940	17,903	20,066
Regulus	15,538	14,878	11,092
Bars, &c.	25,397	32,319	27,023
Total	62,875	65,100	58,181
Exports.			
Manufactured copper, &c.	19,557	18,918	16,608
Unmanufactured do.	8,999	10,793	13,172
Foreign do.	10,475	11,301	7,817
Total	39,031	41,012	37,597

Copper.—Messrs. Richardson and Co. (Oct. 1) report that during the quarter ended September the imports of copper produce at Swansea were—Ore, 25,734 tons; regulus, 3607; copper, 3636; and precipitate, 1170 tons. The exports of copper from Swansea during the quarter were 1046 tons 3 cwts. 3 qrs. The stocks of unsold foreign copper produce on Oct. 1 were—Ore: Chilian, 730 tons; Cape, 414; New Quebrada, 1260; Newfoundland, 6296; Spanish, 319; Portuguese, 45; Californian, 76; Italian, 598; Australian, 255; British, 695=10,688 tons. Regulus—Chilian, 3112 tons; Newfoundland, 120=3232 tons: and Chilian copper, 9920 tons. These totals represent about 12,000 tons fine copper. Our copper market for both bars and furnace material has been quiet; good parcels of the former have changed hands at from 60*l.* to 61*l.* 10s. During the past month we have had but one public ticketing of low produce ores. By private treaty a cargo of Bolivian ore and regulus here has been sold at 12s. and 12s. 3d. respectively, and about 500 tons Cape ore at 12s. 3d. and 12s. The advice of charters from the West Coast for the month is reported as 3300 tons, of which 2150 is in bars; a great part of these engagements are for distant arrival and to order for England or the Continent.—P.S.: Since above stocks were made up the 414 tons of Cape ore have been sold at 12s. per unit.

THE TIN TRADE.

Messrs. Rickards and Budd:—Tin is rising as fast as it fell. An undue depression, based mainly on the large exports from Australia in August, has been followed by a rapid rebound on telegraphic advice that shipments thence in September were only 450 tons. It looks as if we are going to 90*l.* again now that America has resolutely resumed purchases in the Straits, and the consequent probability of none coming thence to England for some time. The delivery of foreign out of warehouse, London and Holland, is—Jan. 1 to Sept. 30, 1880, 14,790 tons, against 15,470 tons in 1879, and 13,900 tons in 1878. The stock of tin in public stocks here and in Holland, omitting Banca in Dutch Trading Company's hands, is—Sept. 30, 1880, 11,000 tons; Sept. 30, 1879, 13,780 tons; Sept. 30, 1878, 13,800 tons.

	1880.	1879.
Shipments of Straits to England, Jan. 1 to Sept. 30..Tons	1,330	2,855
,, Australian	5,398	5,048
Total	6,728	7,903

The quantity of tin exported from the United Kingdom, Jan. 1 to Sept. 30, as shown by the Board of Trade Returns, was—

	1880.		1879.		1878.
English .....Tons	3,253	....against	4,532	....against	4,772
Foreign	6,860	.....	5,886	.....	5,193
Total	10,113	.....	10,418	.....	9,965

Messrs. Vivian, Younger, and Bond (Oct. 8) write—At the Dutch Trading Company's sale, on Sept. 8, 20,608 slabs Banca sold at an average of 49½ fls., equal to about 82*l.* 10s. per ton in Holland. On Wednesday next, the 13th inst., 1300 peculs Billiton will be sold as usual in Batavia. The fluctuations have been considerable during the month. Foreign sold at 84s., and with a few days of steadiness then declined to 90s. A sharp rally to 84s. again followed by a deline to 78s. bringing out a good deal of weak speculative holdings. The market gradually hardened again to 82*l.*, and after the Banca sale a further movement occurred to 85s. owing to Australian shipments for the month turning out only some 450 tons against estimates of 800 tons. With fluctuations down to 83s. 6d., the market closes at 84s. 9d. to 85s. Deliveries from London were 1225 tons, and from Holland 450 tons. The Straits shipments to England were 200 tons and to America 470 tons. The stock of foreign tin in London and Holland is thus estimated:—

	1880. Oct. 1.	1879. Oct. 1.	1878. Oct. 1.
Foreign tin in London .....Tons	7,013	9,438	10,181
Banca tin in Holland	1,860	1,828	1,661
Do. (in Company's hands)	1,573	1,347	977
Billiton tin in Holland	2,124	2,320	1,676
Total	12,370	14,933	14,495
Quantity of tin afloat for Europe	3,000	3,000	3,500

FOREIGN MINING AND METALLURGY.

The Belgian iron trade has shown some little weakness. At present, however, nearly all the Belgian works are well employed—it may even be said that they are very well employed. The Belgian mechanical construction establishments have work assured for some time to come, and their order-books are pretty well filled. The John Cockerill Company, for instance, has orders on hand to the amount of 360,000*l.* The Belgian Metallurgical Company can also exhibit almost equally large figures. The blast furnaces have at the same time their production engaged until December. The present thus looks very well; but what has pushed prices down to a lower point is the almost absolute absence of a future. Pig of the best quality has declined, under these circumstances, to 2*l.* 8s. per ton; there has also been a decline in iron. Plates have been, on the contrary, somewhat better maintained. MM. Dupont and Co., of Fayt, have contradicted a report that they are about to close their works.

In the Nord the iron trade has exhibited a better tone, and the downward tendency in prices has been checked. Prices have been generally sustained in all the French groups. Merchants' iron has made 6*l.* 16s. per ton. Plates have made 8*l.* 16s. to 9*l.* 4s. per ton, according to the importance of orders. In the Meurthe-et-Moselle the general quotation for refining pig is 2*l.* 12s. per ton. The imports of pig and cast iron into France in the first eight months of this year amounted to 115,371 tons, against 106,615 tons in the corresponding period of 1879. The imports of iron minerals into France in the first eight months of this year were 790,535 tons, as compared with 631,744 tons in the corresponding period of 1879. The exports of iron minerals from France in the first eight months of this year were 71,756 tons, against 47,662 tons in the corresponding period of 1879. In this year's imports of iron minerals into France, Germany figured for 191,042 tons, Spain for 214,778 tons, and Algeria for 223,705 tons. The Denain Works have secured a contract for 1040 tons of steel plates at 11*l.* 6s. 9d. per ton. The German iron markets have not exhibited any great amount of strength. Pig has remained at nearly the same level, but bars and plates have fallen upon the Dortmund market. The German ironworks are fairly well employed for the present, but their future prospects are less satisfactory.

The Belgian coal trade has continued to profit from the approach of the winter, and prices have been generally firm for domestic qualities. At present there has been no material change to report, but an advance is anticipated at any moment. In the Hainaut, as well as in the Liége basin, stocks have almost completely disappeared; the demand is everywhere very strong, and working miners are even being sought after. Upon the whole, prices are sensibly higher in the Belgium coal trade than for some recent years. The activity recently noticed in the French coal trade has become more decided, and retail deliveries have been acquiring more importance. Not-

withstanding the magnitude of the stocks of coal now on hand, prices exhibit a firmness which appears to indicate a prospect of high rates prevailing during the winter The autumn begins to make its influence felt in the Austrian coal trade, and most of the merchants are endeavouring to lay in winter supplies, in order that their stocks may not run short as they did last year. Exports of Austrian coal to Germany are being made upon a considerable scale, but there is a falling off as regards Italy. The state of the German coal trade has not materially changed; the production of coal in Alsace and Lorraine presented an increase of 22,568 tons this year.

During the past week very large American orders, especially for railway metals, h5ve been taken at the Rhenish Westphalian works. In addition to large contracts placed with the Dortmund Union, Phœnix Works, and other leading establishments, Messrs. Krupp have booked one for 25,000 tons of rails.

We learn that the John Cockerill Company has just obtained an order for 20 locomotives (with tenders) of the Exhibition type for the Northern of France Railway. It appears that during the first half of this year there have been 34 blast furnaces in blast in Belgium, while 32 have remained inactive. The production of the furnaces in blast amounted to 301,340 tons. The number of ironworks in activity in Belgium in the first half of this year was 47, while only six remained inactive. The works in activity produced between them 256,816 tons of rails, plates, and iron of various kinds. A contract for 2200 tons of Vignoles steel rails is to be let on the 20th inst. for the Belgian State Railways.

It appears that in the first half of this year 157 collieries were at work in Belgium, and that the aggregate production of the half-year amounted to 8,461,306 tons. The number of miners employed was 98,748.

Contracts for a large number of rails and accessories for the railways of Upper Italy will be offered at an early date. Meanwhile it is stated that a memorial signed by the representatives of eighteen metallurgical establishments in Italy has been presented to the Minister of Public Works with respect to the concession for the construction of the Sassuolo-Modena line. According to the terms of the concession the importation of the requisite metals and rolling material is permitted free of duty in case the material cannot be procured in Italy as cheaply as abroad or of equal quality. The memorialists urge that if this arrangement is adopted with respect to all the railways to be constructed in Italy in pursuance of the provisions of the Railway Bill passed in July last year, the Italian metallurgical industries will be completely ruined. The memorialists, therefore, request the Minister to adopt measures for preventing the capital embarked in these industries from being lost. A better illustration of the way in which protectionism endeavours to sacrifice public to private interests could not be given.

GOLD MINE WORKINGS IN SOUTH AMERICA.*

BY GEORGE ATTWOOD, F.G.S., ASSOC. M. INST. C.E.

[*Concluded from the Journal of Aug.* 28.]

The pulverised gold sands having passed over the copper plates now run into a "tye." This is a deep sluice box resting at a gentle angle, and in which any heavy sands, portions of amalgam, or mercury, also sulphides, are collected for further treatment in the "arrastra" or grinder. As fast as the tye becomes fill up the attendant shovels the contents out, and places the sand, &c., on one side; these are then ground up in the arrastra with a small addition of mercury. The sand which escapes the tye falls into an arrastra, which is kept at work as long as the stamps move. One arrastra takes the waste sand from ten stamps, and receives and discharges continuously. Mercury is occasionally added to the arrastra, but as mercury from the copper plates, &c., often find its way into it, a small addition is only necessary. The residues from the batteries, copper plates, and the arrastras are finally centred in one sluice box, and then they pass through a gravity concentrator. The concentrator employed for 20 stamps consists of a sluice box about 18 ft. in length and 3 ft. wide, having six recesses or riffles of about 8 in. in depth placed across the box; it has a fall of 9 ft. in 18 ft., and consequently retains only the heavier materials. The concentrator, working without assistance from any mechanical power and independent of the workman's attention, insures the amalgamator in a climate where labour is naturally enervated against a loss of gold, gold amalgam, or mercury, which might easily occur from negligence or accident in any department of the reduction works. The water is turned off about twice a week, the concentrator is cleaned out, and the sand, pyrites, &c., which it has collected are ground in one of the arrastras.

The anvils are taken out of the mortars once a week, and all the amalgam collected by washing the sand over the copper plates with a stream of water. The plates are then thoroughly scraped with an iron spatula, and the amalgam ground in a wedgewood ware mortar with a little weak sulphuric acid. A strong magnet is also used to take out particles of metallic iron, which are derived from the wear of the iron mortars, shoes, and dies, and always become mixed up with the amalgam. After the amalgam has been thoroughly washed in clean water it is strained through a chamois leather skin which has been previously moistened. The amalgam is then distilled in a small cast-iron retort, 1000 ozs. being the usual charge. The average yield of gold is 47 per cent. from the amalgam. Copper plates, after being in use for some time, are impregnated with a certain quantity of gold, which it is impossible to remove by scraping; when they get too thin or brittle for use they should be melted and sent to market.

Assay of copper plates which have been used for amalgamation, and are now worn out:—The weight of the plates was 167½ lbs.= 2680 ozs., of the value of 1s. 8¾d. per ounce, as the plates contained 2·05 per cent. of gold, making the total value of the plates = 231*l.* 15s.

Assay of copper bars from mill scrapings:—

Bar No.	Weight, ozs.	Fine.	Value per oz.	Total value.
1	34·5	153·0	12s. 11¾d.	£ 22 7 9¾
2	35·5	133·0	11 3¾	20 0 10½
3	34·4	149·5	12 7¾	21 15 0
4	36·6	137·5	11 8	21 7 0
5	20·1	170·0	14 5	14 9 9
6	36·2	161·0	13 8	24 14 8
7	33·8	186·0	15 9½	26 13 9
231·1				£151 8 1

Assays made to test the loss of gold at the Potosi gold mill:—628 tons of gold ore from the Chile Mine were crushed and treated from January to the middle of April, 1878, which yielded at the rate of 3·7 ozs. melted gold per ton. The ore after being stamped and amalgamated was carefully washed through tyes, the richest portions of the sulphurets, &c., saved in the same, and then the entire residue was allowed to collect in the empty bed of the then dry river. Assay of the headings or the richest portions of the tailings collected in the tyes contained sulphurets 96 per cent., gangue 4 per cent.; 6·931 grammes of these sulphurets, after being carefully crushed still finer than the stamps powder it, and then washed, gave 0·252 grammes of gold amalgam.

	Per cent.
The above quantity of amalgam contained mercury	0·1400 = 55·55
" " " copper and trace of iron	0·0045 = 1·79
" " " silver	0·0090 = 3·57
" " " gold	0·0985 = 39·08
Total	0·2520 = 99·99

The 6·931 grammes of sulphurets in the state of amalgam gave 0·0985 gramme of gold = 17·13 ozs. per ton, of the value of 200*l.* 1s. 11d. By assay, after all amalgam and visible gold had been extracted by washing, the 6·931 grammes gave 0·0016 gramme of gold = 0·48 oz. per ton, of the value of 2*l.* 0s. 0¼d.

Mill Assays.—The tailings or residues collected in the river from the 628 tons worked were then carefully sampled, and three samples of about 5 tons each were taken and reduced to a smaller quantity for assay. Sample No. 1 (nearest the mill):—80 ozs. assayed contained—magnetic iron, "small;" black sand or specular iron (from river); gangue, nearly pure silica or quartz; manganese (traces); gold, 0·0018 gramme = 12·032 grains in 1 ton of 1000 lbs.; value of gold, 2s. 0¼d. per ton; water, 8·3 per cent.; sulphurets, 0·05 per cent.

Sample No. 2 (middle portion of the tailings):—80 ozs. assayed contained—magnetic iron, "small;" black sand, "small;" manganese (traces); water and silica, nearly 100 per cent.; water, 7 per cent.; pyrites, 0·05 per cent.; gold, 0·00005 gramme = 0·3313 grain in 1 ton; value af gold, ¾d. per ton.

Sample No. 3 (last portion of tailings):—80 ozs. assayed contained—magnetic iron, "small;" black sand; manganese (traces); water and silica nearly 100 per cent.; water, 8·20 per cent.; pyrites, 0·05 per cent.; gold, 0·0006 gramme = 4·010 grains in 1 ton; value of gold, 8d. per ton. The above assays show the tailings to be of no value, also that the crushing mill does very good work, saving nearly all the gold.

In this paper the author has omitted many small technical details relating to the railway, the pumping and winding engine, &c., which are of ordinary construction, and present no new features of interest. He has confined himself to the general method adopted in working the gold mine, and has also given details of many important matters connected with gold extraction which are not generally known.

* Transactions of Civil Engineers. The communication was accompanied by several drawings.

STEEL TIN-PLATES.

For the purpose of casting small steel ingots, more suitable for the manufacture of tin-plates than the ingots now commonly made, Mr. J. H. Rogers, of Llanelly, employs mould blocks each containing about four mould cavities. The cavities are of a size to produce ingots about 2 ft. long, and weighing about 2 cwt. each; the mould cavities are tapered considerably so that the ingots may readily leave them. In preparing the moulds for casting they are placed with the open end downwards over fire-clay pipes or conductors, such as are at present in use, but having holes by which the melted steel may enter and rise up within each of the mould cavities. The joints are rendered tight by means of sand properly rammed. A suitable number of these moulds, say eight, are thus connected with a central get or runner. The steel being poured into the get or runner passes by the fire-clay conductors into the cavities of all the moulds.

To permit the escape of air and any impurities which may float upon the surface of the metal, a small taper passage is provided at the top of each mould cavity, and over it there a small mould or receiver is placed to contain the metal which rises by the passage out of the mould cavity. Immediately after casting these upper moulds or receivers are detached from the main mould by a blow, leaving the ingots free, and on the moulds being lifted the ingots fall out of the mould cavities. The central get or runner he so forms that it also serves as a mould for ingots; it consists of a rectangular pipe measuring internally about 8 in. by 6, and about 6 ft. long. It is set vertically and divided longitudinally from end to end so that it may be opened to release the long ingot which is formed within it. He renders the point in the get or runner tight by providing corresponding channels in the two parts running parallel to the main cavity from end to end. When the parts of the get or runner are clipped together for use the channels coincide and form passages running through each joint from end to end. These passages are rammed up with sand to prevent the escape of the molten steel. The long ingot produced in the get or runner is broken or divided into pieces about 2 ft. long previous to rolling. By casting in this manner small ingots of steel much labour, fuel, and wear of machinery are saved in the process of rolling the metal down into black plate of the proper substance for tinning.

THE WEEK.

Saturday, Oct. 9.—Sales of home railways were pressed from the opening of the market to the finish. From 154½ Brighton A receded to 158¼; Dover A dropped to 129½; and Sheffield A gave way ¾, closing 59⅝ ⅝. The miserable state of the weather, and the fact of Mondey being the last day of the present account, influenced, no doubt, the closing of many accounts. Foreign Bonds were comparatively steady, but very little business was done. At the finish Spanish were 21⅝, Turks 10⅛, Unified 63, and Mexican 13.

Monday.—A rumour that insignificant Dulcigno might, after all, be surrendered by the Sultan had a magic effect on home railways. Brighton, A, easily obtainable in the early part of the day at 153¼ advanced to 154¼, and could not be put down, notwithanding a decrease in the traffic of nearly 1700*l.* Berwicks rose no less than 1⅝, and most of the others from ¾ to 1. In Sheffield, A, and Great Western the recovery was equal to 1¼. Trunks were a good deal bought, the Second Preference rose 1¼, to 83, and the Thirds, 1 to 41¾. The report of the Western of Canada Railway conclusively shows that, however disappointing the 2s. dividend on the ordinary shares might be, it was out of the power of the board to do more. They had a surplus of 43,246*l.* to deal with, and they have divided it all among the shareholders, with the exception of 846*l.* carried forward.

Tuesday.—Stock was carried over to-day on very easy terms, showing that operations for a fall and for a rise were more nearly balanced than for a long time past. Heavy stocks like North-Eastern and North-Western could be continued for ¼ per cent., or 2*l.* 13s. per 1000*l.*, while the mere stamp alone would absorb 8*l.* or 9*l.* where it was required to be taken up. Brighton, A, was unable to show any recovery, owing to the poor traffic return, and at one time fell to 153; the closing price (154¼ to 154½) was the same as the previous day. Sheffield, A, as is usually the case after a fall, was the strongest of all the markets, and advanced 1⅝ (to 62⅝); the "bulls" take up a lot of this stock again. Great Western advanced to 127¼, and North-Eastern to 167¼. Devon Consols, 10¾ to 11¼. Cape Copper, 40¾ to 41. Chontales, ⅛ to ⅜. Devala Moyar, 2½ to 2¾. I.X.L., ⅜ to ⅛. Rio Tinto, 16⅛ to 17.

Wednesday.—Some one had the courage to give 155 for Brighton A immediately after the opening. At the finish there was no difficulty in getting stock at 152½. Dover A declined to 130½ in sympathy. The best market to-day was North British, when an increase of over 4000 so inspirited the Glasgow market, that they became persistent buyers here, and ran up the price from 85 to 87⅜. Everything in the American market betokened buoyancy, and it is not unlikely that prices will go higher. Erie shares touched 843, and Penns. 861¼. In Atlantic First Mortgage the advance was not less than 2, the closing price being 69½. Trunk Firsts and Seconds improved ¾.

Thursday.—The recovery in home railways that set in on Monday proved of great service to speculators for a rise, since in several instances the making-up price was fixed higher than for the account previous. Thus Great Westerns were carried over at 127, as against 125⅝; Berwicks at 166¾, instead of 164; and Midland at 134, as against 132½; Brighton, however, lost 1½, from 156 to 154½. On the conclusion of the settlement several home railways were in marked request, the lead being taken by Dover, A, which quickly rose, 2½, easing down a little towards the close. Brighton, A, were sold down at one time to 151½, recovering afterwards. A large business was done in Eries at 844.

Friday (*Opening*).—The end of the depression in Brighton, A, seems as far off as ever. The stock is offered at 151*l.*, which is a further fall of ⅞ from last night. Other railways are inclined to firmness, Berwicks being in demand at 168, Great Eastern at 66, and Great Western at 127¾. Unified are 64¾ to 5, and Preference, 94¼ to 5; Turks being 10¾ to 10½, and Mexican, 13½ to 13¾. Trunk, ordinary, 23¼ to 1; First Preference, 92½ to 3; seconds, 81½ to 82 ex div.; Thirds, 41⅛ to 41¾; Erie, 843¼ to 843½. Wheal Crebor, 3¼ to 4; Prince of Wales, 1½ to 1⅝; Parys Corporation, ⅞ to 1⅛; Birdseye Creek, 1⅞ to 2⅛; Emma, 2 to 2¼.—*Two o'Clock.*—Prices are somewhat easier with the exception of Dover, A, now 132. No change is shown in Brighton, A, but British have receded ⅛, Sheffield, A, ⅜, and North-Eastern, ¼. Egyptian Unified have receded ⅛ from last night's price, being now no better than 64½ to 64⅝. New Quebrada, 4½ to 4⅜; South Indian Gold, 1½ to 1¼; Emma, 2 to 2¼; Don Pedro, 11⁄16 to 13⁄16; Devala Moyar, 2½ to 2¼.—*Four o'Clock.*—Some excited dealings have been taking place in Brighton, A. To the surprise of many who were thinking of accepting 151 (the talk being that they would finish at 150) the price suddenly bounded up to 153, and equally as sudden, while 155 was being looked for, fell back to 152; present quotation being 152½ to 153. Pawson, 6⅜ to 6⅝; United Discount, 5⅜ to 5½; National Discount, 11 to 11¼; Milner's, 8½ to 9; General Credit, 4⅛ to 4⅜; Rhymney Iron, 23 to 25 (50*l.* paid); new shares, 7½ (15*l.* paid).

Ferdinand R. Kirk.

Detecting Fire-Damp.—The invention of Mr. John Aitken, of Falkirk, for improvements in detecting fire-damp and other inflammable gases in mines and other places, consists in the use in certain ways hereinafter described, of catalytic substances, such as platinum in its different forms and combinations, but he does not confine himself to the use of platinum, but includes all those analogous classes of substances known to chemists as capable of producing contact or catalytic action, such as palladium, rhodium, iridium, osmium, gold, silver, cobalt, nickel, charcoal, or carbon, pumice stone, porcelain, glass, rock crystal, fluor spar, tow, cotton, rags, and platinised charcoal in their different forms and combinations. Any catalytic substance may be used alone, or it may be mixed with some other catalytic substance with a porous substance, or with some neutral substance; or the catalytic may be deposited in the pores of any substance by any of the well-known chemical processes.

Throat Irritation.—Soreness and dryness, tickling and irritation, inducing cough and affecting the voice. For these symptoms use Epps's Glycerine Jujubes. Glycerine, in these agreeable confections, being in proximity to the glands at the moment they are excited by the act of sucking, becomes actively healing. Sold only in boxes, 7½d. and 1s. 1½d., labelled "James Epps and Co., Homœopathic Chemists, London." A letter received: "Gentlemen,—It may, perhaps, interest you to know that, after an extended trial, I have found your Glycerine Jujubes of considerably benefit (with or without medical treatment) in almost all forms of throat disease. They soften and clear the voice. In no case can they do any harm.—Yours faithfully, Gordon Holmes, L.R.C.P.E., Senior Physician to the Municipal Throat and Ear Infirmary."

Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES—No. CLXIII.*

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,

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ON VENTILATION.

The use of high pressure steam for the ventilation of collieries appears to have been proposed by Mr. Buddle, about the year 1807, the steam being carried to the bottom of the upcast pit in wooden pipes. In 1837 the use of a jet of high pressure steam for the production of a ventilation current, after the mode of using the blast-pipe in locomotives, was proposed by Mr. Gurney to a Committee of the House of Commons. In 1836 the proposal of heating the ascending air column by steam was made by De Vaux in Belgium. In 1843 M. Mehu, a former student of the School of Mines at St. Etienne, proposed the use of a steam-jet, relying mainly upon it as an exhausting agent. In 1844 the matter was made the subject of elaborate experiments by M. Glepin; and in 1853 the matter was practically experimented upon on a large scale by Mr. Nicholas Wood.

The steam may act in several ways.—1. By raising the temperature of the ascending air current.—2. By exhausting the air.—3. By propelling the air before it. It may also be considered as acting mechanically, carrying the air along with it. The steam was at first generally taken from boilers placed underground, for the purposes of underground haulage, or the exhaust steam from underground hauling or pumping engines; or, again, the steam was brought from boilers at the surface to the bottom of the upcast shaft.

The following details respecting the experiments of M. Dickenson at the Pemberton Cannel Pits of the Ince Hall Colliery are given in Lottner-Serlo's Manual. The two shafts at the Pemberton Pits are 10 ft. in diameter, and serve for the working of two seams, respectively 187 and 214 yards deep. In the lower seam are two steam-boilers, 20 ft. long and 5 ft. in diameter, steam being generated to 50 lbs. pressure per square inch, and injected into the shaft in fourteen jets. The pits are generally ventilated by means of a furnace in the seam, and the steam is intended for use only when the furnace is not in operation, or at night when the underground engines are at rest. The steam is led from the boilers in a 5-in. pipe, which terminates in a vertical pipe, placed in the level about 60 ft. from the bottom of the upcast shaft. Connected with this vertical pipe are five horizontal 3 in. pipes, to which the 14 steam-jets are affixed. The diameter of the jets is ⅜ in. Opposite and close to each jet is a sheet cylinder, 6 ft. long and 1 ft. in diameter. The spaces between the cylinders are blocked up tight, and likewise the space between them and the sides of the level, so that no air can pass along the level without going through these cylinders. The mouths of the cylinders, which are 1 ft. in diameter, must not be placed too far from the jets, since the steam from the jets forms a cone 1 ft. in diameter at 3 ft. from the jet, with a pressure of from 30 lb. to 40 lb. per square inch. The following are comparitive details of the effect of the steam and furnace:—

	Temperature Fahr. in Upcast.	Downcast.	Difference.	Ventilation p. min.—c.ft.
1.—Furnace alone, no fire beneath boilers	143°	43°	100°	44,500
2.—Low fire beneath both boilers, steam not blown off, and the furnace fire out	122°	50°	72°	35,200
3.—Ditto, steam kept up at 50 lbs.	150°	50°	100°	44,500
4.—Ditto, steam blown off from ten jets	152°	48°	104°	50,000

In the latter case 1 lb. of coal exhausted 6550 cubic feet, and in the first case, with furnace ventilation alone, 11,500 cubic feet were exhausted per 1 lb. of coal burnt. At the Cannel Pits two shafts were used as downcast and one as upcast shaft, the ventilation being ordinarily produced by a furnace 6 ft. wide. In addition there are two boilers for underground engines; the boilers are 40 ft. long and 5 ft. in diameter. The steam was exhausted direct into the shaft, first in 14 and afterwards in 18 jets. The effect was as follows:—

	Ventilation p.min. cubic feet.	Ventilation p. 1 lb. coal—c.ft.
With furnace alone	54,000	5,800
With two boiler fires, steam blowing off at 60 lbs.	53,300	4,740
With furnace, boiler fires, and steam from 18 jets	64,800	3,150

According to the experiments of Mr. Nicholas Wood at the Hetton Colliery, 160,000 cubic feet of air were exhausted per minute with a drag of ·8 in. by the water guage, by means of 37 steam jets, ¼ in. diameter. The steam was generated to 40 lbs. pressure in two boilers, 5 ft. 6 in. diameter and 26 ft. long, with a consumption of 25 lbs. of coal per minute, the temperature of the downcast being 46° and the upcast 90°. After deducting the effect due to natural ventilation the useful effect of the steam jets was found to give ·36 horse-power per 1 lb. of coal consumed per minute. At the Belmont Colliery the furnace alone gave a ventilation of 46,000 cubic feet per minute, 27 steam jets without furnace 62,400 cubic feet per minute and 37 jets with the furnace 75,000 cubic feet per minute. At the Castle Eden Colliery the effects of natural ventilation gave 30,000 cubic feet of air per minute, with steam jets 37,000 ft., with a ventilating furnace 44,700 ft., and with a furnace and 42 steam jets combined 49,000 cubic feet per minute. At the Tyne Main Colliery 61 jets of 3-16 in. diameter were placed near the mouth of the pit, the jets exhasting into cylinders 11 in. diameter and 6 ft. long, the space between the cylinders being closed: 49,500 cubic feet of air were exhausted, with a drag of 4 in. of the water guage. The useful effect of the jets per 1 lb. of coal consumed per minute was 498 horse-power, whilst with the furnace the useful effect per 1 lb. of coal burnt per minute was ·81 horse-power, or eight times as much as given by the steam jets.

From the above figures it will be seen that the consumption of fuel for ventilating a colliery by means of steam-jets is from six to ten times as great as when a furnace is employed. The use of steam-jet ventilation appears, therefore, advisable only for special or exceptional circumstances, such as sinking shafts, or after an explosion. At the New Friedenshoffnungs Colliery, near Waldenburg, the shaft and the levels when first opened out were well ventilated by allowing the steam from the engine to exhaust into the upper part of 8-in. wooden air pipes, which extended from the bottom of the shaft (180 yards deep) to a little above the top of the engine-house. At Javorgno Herr Muller made use of the exhaust steam from the engine for ventilating a cross-cut driven from the engine-shaft. The horizontal exhaust pipe entered the closed end of a wooden pipe, which was joined near the closed end by the wooden ventilating pipe from the shaft.

A stream or jet of water can be employed for producing a rarefaction of the air, in a similar manner to the use of the steam-jet. We have pointed out that the steam-jet may not only act mechanically, but also by warming the upcast current. In a similar manner a stream or jet of water may act by cooling the air, as well as mechanically by carrying the air along with it, or producing a rarefaction. On this account a jet of water is generally employed in the downcast shaft of a colliery after an explosion, when it would be dangerous to relight the furnace, or where a ventilating machine is employed when the latter is damaged. The most general method of producing a current by means of a falling stream of water is one which was perhaps more used for metallurgical than mining purposes. This apparatus consists of a long vertical pipe (fall-pipe), which is connected at the upper end with a reservoir of water, and at lower end with the top of a box, which is open only at the bottom. Immediately below the mouth of the fall-pipe, where it enters the

* Being Notes on a Course of Lectures on Mining, delivered by Herr Bergrath Dr. Von Groddeck, Director of the Royal Bergakademie, Clausthal, The Harz, North Germany.

box, is a flat or conical shaped piece of wood, on which the stream of water falls, and splits up, liberating more easily the air which has been carried down the fall-pipe with the water. According to some the diameter of the piece of wood on which the water falls should be 1½ times that of the fall-pipe. A second delivery pipe is inserted in the top of the box for carrying off the air, either for ventilation in the case of mines, or to the furnace. The box into which the lower end of the fall-pipe emerges is placed in a small pit, from which an overflow trough carries off the water. The difference in the level of the water inside and outside the box gives the pressure of the blast, which may readily amount to 18 in. Near the upper end of the fall-pipe several openings or slits are made, through which the air is drawn into the fall-pipe. The water does not usually find direct access into the fall-pipe from the reservoir, but passes through a small funnel, the diameter of the lower end of which is five-eighths that of the fall-pipe into which it delivers, or two-fifths the area. The openings for the air are inclined downwards. In order to regulate the amount of the water the funnel through which it passes into the fall-pipe can be more or less closed by a conical pin or stopper. Instead of the slits for the access of the air the fall-pipe may not reach quite to the bottom of the reservoir, so that the air is drawn in in the annular space between the funnel and the top of the fall-pipe. Again, the fall-pipe may pass up to the bottom of the reservoir, being formed conically inside at the upper end, and the air may be drawu down in a long conical tube, with the narrow end reaching within the top of the fall-pipe, and the upper wide end being above the surface of the water in the reservoir. The water generally stands from 30 in. to 5 ft. high in the reservoir. The fall-pipe varies in diameter from 6 in. to 10 in., and in length from 9 to 24 ft. A length of more than 40 yards is said to be unadvisable. The size of the box into which the lower end of the fall-pipe delivers should give in cubical contents from 20 to 30 cubic feet. The pressure of the blast thus obtained varies from 2 to 3 ft., with a fall for the water of 15 ft. to 30 ft.; the amount of water used being from 2 to 3 cubic feet, and the amount of blast produced from 1½ to 4 cubic feet. The useful effect of this apparatus is small, however, averaging, according to D'Aubuisson, only 1-10th to 3-20th of the power employed; and, according to later experiments by Rittenger, only 1-20th. Except the question of first cost it would, therefore, be much more economical, in the case of water-power, to use an hydraulic motor for driving a ventilating machine.

The influence of winding in both shafts on the amount of ventilation will be evident from the following results of experiments at Kirklees Hall Colliery, Wigan. The same engine winds from both shafts, so that whilst the cage is ascending in the one shaft it is descending in the other. When the winding engine is at rest the amount of ventilation was given as 62,000 cubic feet per minute. When the cage is descending in the upcast and ascending in the downcast shafts the ventilation is given as 37,400 cubic feet per minute. When the cage is ascending the upcast and descending the downcast shafts the ventilation amounted 67,400, or the mean during winding is 52,400 cubic feet, or 9500 less during winding operations than when the cages are at rest. The shafts are 85 square feet area, and the velocity of winding 15 ft. per second, or 900 ft. per minute, slightly greater than the velocity of the air current in the shaft.

GLASGOW PHILOSOPHICAL SOCIETY'S EXHIBITION.

Although the Exhibition of Apparatus for the Utilisation of Gas, Electricity, Oils, &c., and of Hydraulic, Architectural, Mining and Sanitary Appliances, inaugurated by the Philosophical Society of Glasgow, and now open, does not afford the opportunity anticipated of comparing the various sources of illumination and ascertaining their relative merits, the Burnbank Drill Hall is well worthy of a visit, not only gas apparatus but coal and safety-lamps being well represented. Perhaps the most attractive feature is the new Ericsson engine exhibited by Messrs. Thomson, Sterne, and Co., of London, and as Mr. Ericsson is a very old correspondent of the *Mining Journal*, it is gratifying to find that he appears at last to have achieved a complete success. There is neither outlet nor inlet to the cylinder. The air which it contains is alternately heated and cooled, and this is achieved by a displacer working loose in the cylinder, which alternately displaces the heated air from the bottom of the cylinder to the under-side of the piston at every stroke—the upper portion of the piston being open to atmospheric pressure. The little pump exhibited is capable of raising 200 gallons to a height of 25 ft. every hour, and gives a continuous stream. The water thus pumped plays an important part in the engine, for it surrounds the upper part of the cylinder, and thus cools the air inside. This engine, the fitting parts of which are all external, is being made from the smallest size up to one capable of pumping 10,000 gallons of water per hour. The Otto Silent Gas Engine exhibited by Messrs. Crossley Brothers also attracts considerable attention. The motive power is the expansion of gas (first compressed) in the cylinder, but the defect in what otherwise is a perfect engine is that the expansion occurs only at the rear of the piston rod. The makers, in order to compensate for the deficiency of propulsive power in the front part of the cylinder, use a very heavy fly-wheel, the momentum of which gives a steady motion in the periods between the ignition of the explosive compound. The Bisschoff gas engine is a cheap modification of the old vertical Otto, and where very small power is required would be useful.

The exhibits of safety-lamps are very numerous, but it is difficult to find any worthy of special mention—self-extinguishing lamps are still fashionable with inventors, although practical men attach little importance to the principle. Thus Mr. James Brownlie, of Glasgow, has a lamp of this class with the old fashioned soft-lead pin fastening, and Mr. James M. Douglas, Edinburgh, exhibits an invention on a somewhat similar principle—the utter extinction of the light by the slightest effort to unscrew the bottom of the lamp. This principle, it seems, can be applied to existing safety-lamps. Mr. H. M. Edwards, Wakefield, shows an improved lamp called the Williamson, the main characteristics of which are the mode of regulating the ingress of oxygen to the flame, and the protection of the flame by two glass cylinders, so that, in the event of a drop of water falling on the outer glass while hot and cracking it the inner cylinder still protects the light. Messrs. Ewart and Son, of London, show a variety of water-heaters, which must prove a useful adjunct to the bath where hot water is not obtainable. Water enters direct from the main at the one side, and comes out at the other side at a temperature of somewhere about 90°. The rapidity with which the change in temperature is brought about is something amazing, and it is all the more astonishing that this is accomplished at an expense of something like a penny an hour for gas. The same firm show an adaptation of the Bunsen to the bottom of the bath itself, which gives good results.

Gas stoves and similar apparatus are very plentiful, the heating and cooking stoves of Dr. Adams, of Glasgow, being the most attractive novelty. The outer casings, it is explained, are coated with a metallic alloy that practically neutralises or lowers very considerably their power of losing heat outwardly by radiation. It is a statement made within very cautious limits when it is asserted that from four to twelve times more heat is lost from the customary iron casings of gas cooking stoves that can escape from the casings of Dr. Adams' stoves, because of the outer skin of metallic alloy with which the latter are coated. This special coating is inseparably incorporated with the metal underneath by electo-chemical process, and is not to be confounded with a mere mould-facing, or with gilding, or with bronze varnishings, &c., from all which it differs essentially in the results as applicable to the conservation of heat. The heated force is generated and applied in burners, enclosed and protected from the cooling influence and wasteful dissipation of heat that necessarily results from the use of burners exposed to free and uncontrolled access of air. Pure radiant heat, of very powerful force, is generated by a peculiar method of burning gas, and this heat is effectively applied to the ovens, cooking chambers, boilers, &c.; while the hot gases, commonly treated as waste gases, are also fully utilised, and may be directed at pleasure, in a concentrated current, to effect the extra heating of any of the stove compartments without coming into contact with the food. Thus meat is roasted in the roasting oven precisely as if done before an open fire, and all ordinary cooking processes are conducted without the food being contaminated or characteristic delicate flavours injured by the moisture impregnated with sulphurous, ammoniacal, and other gaseous products which necessarily result from burned gas.

NORTH STAFFORDSHIRE MINING INSTITUTE.

A meeting of the members of this Institute was held at Stoke-on-Trent last week, when the chair was taken by Mr. JOHN BROWN.

The following gentlemen, having been previously nominated, were elected members:—Mr. Charles John Blagg, solicitor Cheadle, Staffordshire; Mr. John Thomas Dawes, mining engineer, Cefn Mawr Hall, near Mold; Mr. Thomas Getrych Davies, mining engineer, Talk-o'-th'-Hill: Mr. Saul Isaac, colliery proprietor, Clifton Colliery, Nottingham; Mr. Charles Maynard, mining engineer, Talk-o'-th'-Hill; Mr. John Roscoe, mechanical engineer, Hyde, Manchester,; Mr. Francis C. B. Sainsbury, engineer, &c., Castle Hill Foundry, Newcastle, Staffordshire.

At a meeting of the Institute in April, Mr. BAKEWELL read a paper on "Explosions in Mines, and the Mines Regulation Act, 1872." A committee was appointed to consider the paper, and they presented a report in the form of a series of resolutions. The first portion of the report having reference more particularly to explosions, explosives, and the lighting of mines was discussed at the August meeting. A lengthy discussion now took place respecting other portions of the report.——Mr. A. R. SAWYER now gave a comparison of the proportion of lives lost to the number of persons employed, and to the output in Great Britain and Ireland and Prussia.—[This subject is fully referred to in another column of this day's Journal.]—In 1878, in Great Britain, there were 103,183 tons of mineral raised per life lost, and for every life lost there were 336 persons engaged. In Prussia there were 401 persons employed and 95,868 tons raised for every life lost. But 1878 was an exceptionally fatal year in England, owing to two large explosions, which together caused the death of about 450 persons. Taking previous years, it was found that England was far in advance of Prussia respecting the proportion of lives lost to the number of persons employed. Thus, in 1877 there were 409 persons employed in Great Britain and 407 in Prussia for every life lost; in 1876, 551 to 378; in 1875, 430 to 333; in 1874, 510 in Great Britain to 377 in Prussia, How it that, notwithstanding the technical education possessed by all in authority in Prussia, the comparatively small depth of many of its mines, and its stringent mining laws, how was it that the death-rate was so much smaller in great Britain than in Prussia? He believed it was the result of our Coal Mines Regulation Act and our most practical system of inspection. In Prussia the system of inspection was bad. Mr. Sawyer then proceeded to criticise Mr. Bakewell's paper with reference to ventilation and inspection, contending that the present system of inspection was effective, and gave instances in which forewarning on the part of an inspector had been the means of saving many lives.——The meeting then proceeded to discuss that portion of the report of the committee which referred to the impracticable character of the clauses of the Mines Regulation Act which refer to timbering and ventilation; also the desirableness of appointing one or more under-lookers, having certificates of competency, to look after details in each pit. The system of taking legal proceedings against the most subordinate official of a pit, then the manager, and the agent of the owner as well, was condemned; but several members insisted on the importance of continuing to make the certificated manager responsible for every defect.——The discussion having occupied two hours was further adjourned.

SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE INSTITUTE OF MINING ENGINEERS.

The second excursion of this season of the members of the above Institute took place last week from Dudley, the places selected to be visited being Walsall Wood, Aldridge, and Hamstead Collieries. Upwards of 60 members attended, amongst them being Mr. W. J. HAYWARD, President; Mr. Alexander Smith, M.Inst. C.E.; Messrs. Henry Johnson, Sen.; Henry Johnson, Jun.; John Hughes; Isaiah Foley; Thomas Roper; W. Farmworth; D. Kendrick; W. H. Whitehouse; Jonah Davies; D. Rogers; J, M. Fellows; Job Tomson; S. Spruce; George Jones; Thomas Pasfield; J. H. Price; W. Wardle; C. H. Treglown; T. Price; R. D. Dodd; S. Rowley; F. F. Jones; T. Parton; James Ritson; J. H. Bullock; J. Broughall; S. N. Dimbledy, &c., &c. Arrived at Walsall Station, a halt was made for a few minutes to allow several gentlemen to join the party. A start was again made, and after a refreshing drive of little over half-an-hour, the company arrived at Walsall Wood Colliery, where they were met by Dr. Cooke, Mr. George Thomas (Mayor of Walsall), Mr. W. H. Duignan, and Mr. Kendrick, directors. There are two 15-feet shafts in connection with this colliery, 585 and 565 yards deep respectively In the former considerable difficulty was experienced in sinking the first 150 yards, owing to the water which is now kept back by cast-iron tubbing. It is in this pit the deep coal is worked, which has been found to be of such splendid quality.

The company then descended the pit, conducted by Mr. H. C. Peake, the manager. The attention of the party was called to the working of the self-acting endless rope, which brings the coal a distance of 500 yards. Those who had a taste for geology were greatly interested in the green rock, which, in driving out after sinking through 350 yards of red measure, was found to come up from below. The company next repaired to the facings, and after inspecting the deep coal, returned to the bottom of the shaft. They were loud in their praise of the excellent roof of the pit; the pure air which pervade it from one end to the other, and the dryness that is everywhere to be seen, makes the life of those who have to work so many yards down in the bowels or the earth as pleasant and as free from danger as can possibly be the case under the circumstances. After returning to the surface, the party repaired to a temporary erection, about 100 yards from the pit, where a capital luncheon was provided by the company. After luncheon Mr. Hayward, the President, on behalf of the members of the Institute, thanked the Walsall Wood Colliery Company for their kindness and hospitality. So far as the arrangements of the colliery were concerned he was quite sure they would all agree with him that they were most admirable throughout. He believed that at the commencement of that company's operations great difficulties presented themselves, owing to the water in the sinking, but he was pleased to observe, since his last visit, great progress had been made, and he was confident that all the company required now to make the colliery a grand success was good trade. The President concluded by proposing success to the Walsall Wood Colliery Company, coupled with the names of the chairman of the directors, Dr. Cooke, and the manager, Mr. Peake. (Applause.)

Dr. COOKE, in responding, said he had very great pleasure on behalf of the directors in welcoming the visitors of that day. He considered that the Institute had conferred an honour upon them by their visit, and, listening to the eulogistic remarks of the previous speaker regarding the way the colliery was worked, he felt very proud in being connected with it. At one time they had a great deal to contend with in the shape of water, having to pump no less than 700 gallons per minute, but he was thankful to say that all that had been overcome successfully, and what they required now, as had been already said, was good times.

Mr. PEAKE, the engineer to the company, said he was very pleased to think that what they had seen that day had met with their approval. As has been stated, the quantity of water was at one time their great difficulty, but they had surmounted it, and, as they had observed that day, the mine was perfectly dry.

Mr. KENDRICK had great pleasure in proposing success to the South Staffordshire and East Worcestershire Institute of Mining Engineers. Associations such as those did incalculable good, not only to the members themselves but to those who were depending on their skill and ability. He coupled with the toast the names of Mr. Hayward and Mr. Johnson.

Mr. JOHNSON, in responding, said that now the colliery had got into fair working order he hoped the good times so anxiously looked forward to would soon come and give them that success which he and all associated with him so much desired their company should have. (Applause.)

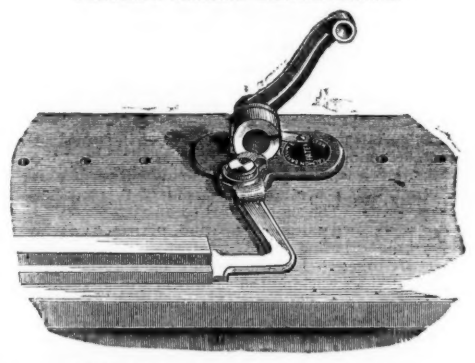
The party then proceeded to Aldridge Colliery, where they were met by Mr. William Farnworth but owing to the lateness of the hour it was impossible to do more than take a cursory glance at the machinery of the colliery and brickworks.

After partaking of refreshment provided by the company, Hamstead Colliery was visited, and a descent of the pit was made by Mr. David Peacock, and the party examined the thick coal which has so recently been discovered, and is a continuation of the Sandwell Park measures, and of excellent quality. A light refreshment having been partaken of the members of the Institute drove back to Dudley.

ROYAL SCHOOL OE MINES.

The introductory lecture to the course of Metallurgy was delivered last week by the new professor, Mr. W. Chandler Roberts, F.R.S., chemist of the Mint. Dr. Percy, who has held the professorship since the foundation of the Royal School of Mines, concluded his introductory lecture in 1851 by pointing out that in proportion to the success with which the metallurgic art was practised in this country would the interests of the whole population in no inconsiderable degree be promoted. After reminding his audience of the great development of the metallurgical knowledge of the country due to Dr. Percy's labours, Mr. Roberts referred to the vast changes that had been effected in the scale and character of metallurgical operations since the above date. Passing to the early history of metallurgy he instanced the action of oxygen on lead as illustrative of the great influence of this subject on the advance of chemistry. The separation of silver from lead by processes which were still employed was known to early Jewish writers and to the Greeks, as was proved by recent discoveries of Dr. Schliemann; while the fact that the mass produced by calcining lead in air was heavier than the initial weight of lead attracted much attention from the time of Geber, in the eighth century, till the latter end of the 17th century when the facts were correctly explained. Of the various theories formed to account for it, he showed that those of the metallurgists Biringuccio and Becher, authors of the Phlogistic Theory of Chemical Change, were perhaps the most interesting, and he mentioned that some of the earliest experiments recorded by our own Royal Society were a metallurgical series communicated by Lord Brouncker in 1660, and relating to the increase of weight of lead on the "copels" in the assay office in the Tower. He also referred to the importance attached to these phenomena in the modern views as to the mechanical theory of heat. The absence of accurate knowledge on the part of those who conducted operations at high temperatures was lamented so long ago as 1700 in an inaugural dissertation on metallurgy, at which the great Stahl presided, and in speaking of the relation of practical to theoretical men Mr. Roberts pointed out that, viewing metallurgy as a manufacturing art, it must be remembered that when the truth of a theory had been demonstrated a dividend had still to be earned, and this would in most cases be difficult without the aid of the technical man. He insisted, therefore, on the importance of recognising the true relation between science and practice, and quoted at some length the opinions of eminent authorities to show that the metallurgical teaching should mainly be confined to those sciences which bore upon practice, but that practice itself should be acquired in the works, and not in the laboratory. Before the School of Mines was established the metallurgical success of this country depended mainly on its technical men, and it was interesting, Mr. Roberts said, to note that the new process for the dephosphorisation of impure varieties of iron by basic linings in the Bessemer converter might to a very large extent be claimed as the result of Dr. Percy's teaching, students of the school having mainly contributed to the practical solution of the problem.

JOINER'S PATENT BENCH KNIFE.



An improved joiner's bench knife, of which the above is an illustration, has just been brought into the market by Messrs. SALMON, BARNES, and Co., of Ulverston, who state that they have every confidence in saying that it supplies a long felt want, as it thoroughly answers the purpose intended, and is compact, cheap, aud secure, and is used without any loss of time, as the work can be secured or released instantly by a touch of the lever. In all these respects it entirely differs from the old bench dogs in present use, which are comparatively useless, besides being very much in the way of work on the bench. It will be seen that the new bench knife consists of a very small bed-plate, having two pins on the underside to drop into holes in the top of the bench, and an arm or knife for holding the work firmly between itself and the bench hook; this arm or knife is pushed against the work by the action of the small lever handle and cam. The dimensions are only 3½ inches in width by 9 inches in length over all, and as the knife is made in a very compact form, it is not in the least in the way on the bench. The weight is only 2 lbs., so that it can be comfortably carried in an ordinary joiner's kit. It will securely hold, and can be instantly adapted to any piece of work of whatever length or thickness, without trouble or inconvenience, at once doing away with the ordinary bench knife, which always cuts into the bench top, and frequently makes it quite unfit to work on.

TRIPOLI SALT.—Writing from Bengazi, Consul Dupuis remarks that the extensive lagunes in the immediate neighbourhood of this town are a most prolific source of revenue to the Central Government, yielding, at a very trifling cost of labour and money, on an average some 200,000 tons of salt annually. It is a Government monopoly, and is sold in Constantinople before delivery. The produce last year was about 180,000 tons, and was valued at 40,000*l*.

VENTILATING MINES.—Hitherto not only have many serious disasters occurred, frequently accompanied with great loss of life, caused by the explosion of the vitiated gases collected in mines and other similar places; but the health of the miners and other operatives employed has been seriously impaired owing to the impure state of the atmosphere in such localities arising from the imperfect system of ventilation adopted therein. Now, the object of the invention of Mr. THOMAS SUTHERST, of the Inner Temple, Barrister-at-law, is to so purify the atmosphere in a mine or other subterranean working that all danger of explosion is obviated, at the same time that the miners and other workers therein can follow their respective occupations without detriment to health. This he accomplishes by means of a system or systems of pipes or tubes so arranged within the mine, colliery, or other place that a constant supply of fresh air is introduced therein, and upon the escape of any foul air or gases occurring within the mine or other place the same are so diluted and weakened as to become innocuous, and are carried off by means of the fresh air so introduced into the mine or working through such pipes. In order to force the fresh air into such pipes and thence into the workings he employs suitable mechanical means, the density of pressure employed being regulated according to the distance to be traversed. He also so arranges the joints of the pipes that they may be connected and disconnected with the utmost facility, so that their position may be readily changed should circumstances require.

PARIS EXHIBITION, 1878.

GOLD AND SILVER MEDALS AWARDED for Steam-Engines & Boilers, also the Special Steam Pump, and Compound Pumping Engine.

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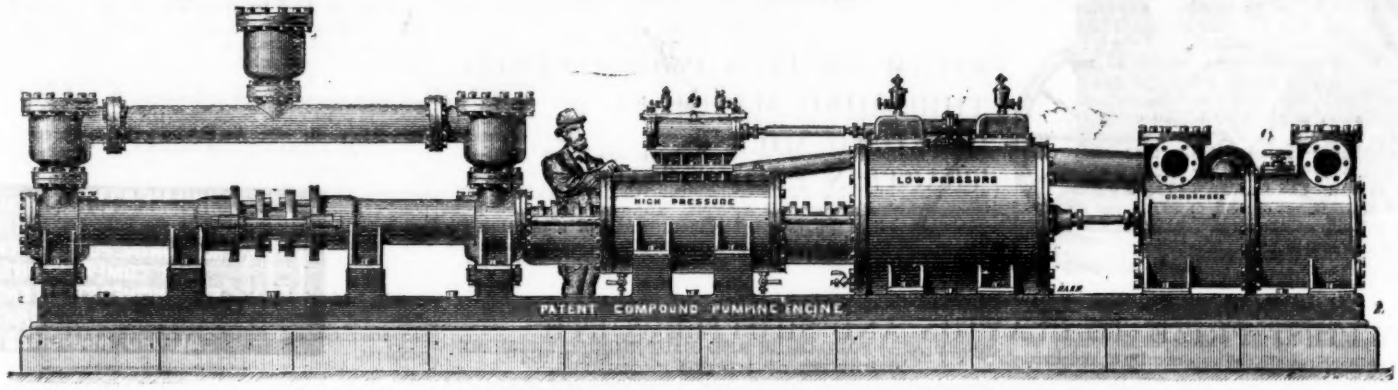
AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

TANGYE'S DIRECT-ACTING
COMPOUND PUMPING ENGINE,

For use in Mines, Water Works, Sewage Works,

And all purposes where Economy of Fuel is essential.



TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, WITH AIR-PUMP CONDENSER.

TANGYE'S COMPOUND PUMPING ENGINE COMBINES SIMPLICITY, CERTAINTY OF ACTION, GREAT ECONOMY IN WORKING, COMPACTNESS, AND MODERATE FIRST COST.

This Engine will be found the most simple and economical appliance for Mine Draining, Town Water Supply, and General Purposes of Pumping ever introduced, and as regards Mine Draining, the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pitwork, are required, while they allow a clear shaft for hauling purposes. In this Engine the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere.

The following first-class Testimonials will bear evidence as to the efficiency and economy of the Engine:—

TESTIMONIALS OF TANGYE'S COMPOUND PUMPING ENGINE.

Newcastle and Gateshead Water Company, Newcastle-on-Tyne, Oct. 20, 1879.
21" / 36 × 10" × 48" COMPOUND CONDENSING STEAM PUMPING ENGINE.
Messrs. Tangye Brothers.

GENTLEMEN,—In reply to your enquiry as to the efficiency of the two pairs of Compound Condensing Engines recently erected by you for this company at our Gateshead Pumping Station, I have great pleasure in informing you that they have far surpassed my expectations, being capable of pumping 50 per cent. more water than the quantity contracted for; and by a series of experiments I find they work as economically as any other engine of the compound type, and will compare favourably with any other class of pumping engine. By the simplicity of their arrangement and superior workmanship they require very little attendance and repairs, and the pumps are quite noiseless. A short time ago I had them tried upon air by suddenly shutting off the column, and found they did not run away, thus showing the perfect controlling or governing power of the Floyd's Improved Steam-moved Reversing Vale. I will thank you to forward the other two pairs you have in hand for our Benwell Pumping Station.

Yours respectfully,
(Signed) JOHN R. FORSTER, Engineer.

The Chesterfield and Boythorpe Colliery Company (Limited),
Registered Office, Boythorpe, near Chesterfield, Oct. 1, 1879.
21" / 36 × 12" × 48" DOUBLE RAM COMPOUND CONDENSING STEAM PUMPING ENGINES.
Messrs. Tangye Brothers. Supplied in January, 1878.

GENTLEMEN,—Referring to the above, which we have now had working continuously night and day for the last 12 months, we are glad to say that it is giving us every satisfaction. It is fixed about 400 feet below the surface, the steam being taken down to it at pressure of 45 lbs. per square inch. We can work the pump without any difficulty at 28 strokes per minute—224 ft. piston speed. The pumping power is enormous. The vacuum in the condenser being from 11½ to 13 lbs. The pump is easily started, and works well and regularly. The amount of steam taken being much less than we anticipated. We consider the economy in working very satisfactory indeed. The desire for power and economy at the present day will certainly bring this pump into great requisition.

Yours truly,
(Signed M. STRAW, Manager.

SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder	In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder	In.	14	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder	In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke	In.	24	24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate		3900	6100	8800	6100	8800	12.000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	Non-condensing	360	330	160	360	250	184	140	360	264	202	130	360	275	175	122
Ditto ditto ditto—with Holman's Condenser		480	307	213	480	333	245	187	480	352	269	173	480	367	234	162
Ditto ditto ditto—with Air-pump Condenser		600	384	267	600	417	306	335	600	440	337	216	600	459	203	203

CONTINUED.

Diameter of High-pressure Cylinder	In.	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30	30
Ditto of Low-pressure Cylinder	In.	28	28	28	28	32	32	32	32	36	36	36	42	42	42	52	52
Ditto of Water Cylinder	In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	12	14
Length of stroke	In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate		15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,050	35,225	47,950
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	Non-condensing	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562	
Ditto ditto ditto—with Holman's Condenser		480	307	213	154	603	389	269	198	528	363	269	691	480	352	750	
Ditto ditto ditto—with Air-pump Condenser		600	384	267	191	750	486	337	248	660	450	337	864	600	440	937	

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

NORTHERN DEPOT:—TANGYE BROTHERS, St. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.

TWO GOLD MEDALS.

FOX'S PATENT CORRUGATED FURNACE FLUES,

NOW APPLIED TO OVER

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PARIS, 1878.

SOLE MAKERS—

The LEEDS FORGE CO., Ltd.,
Leeds, Yorkshire.

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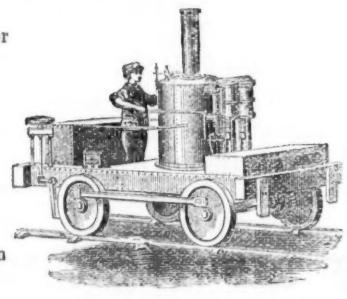

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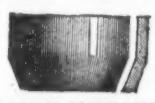

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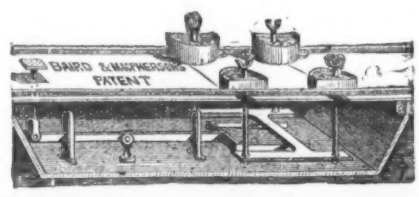

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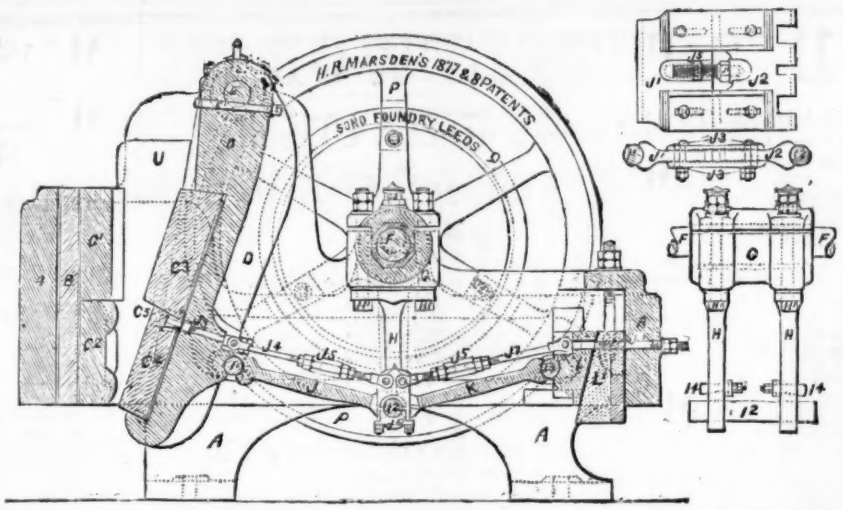

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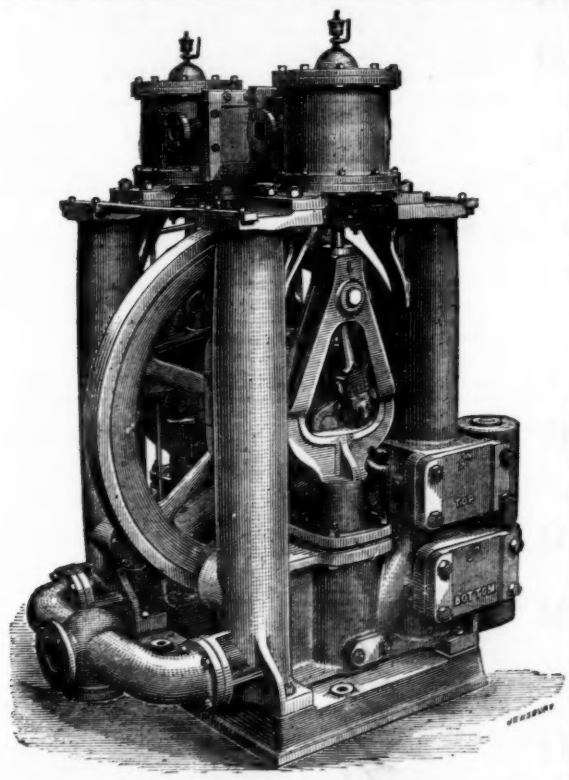

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